



## COMMENTS ON GROUNDWATER DISCHARGE PERMIT

By Charles Judd – October 26, 2009

Thank you for opportunity to comment on the proposed amendment to EnergySolutions Groundwater Discharge Permit (UGW450005). It seems that the permit review has been done in a professional and thorough manner. After our review it has become clear that there are a few other items that should be considered and a couple of small changes that should be made to the permit. These items are listed below:

- 1) **Water Balance Infiltration Models** - On page 3 of the Statement of Basis it says "Water balance infiltration models, constructed to evaluate seepage through the disposal cell, for both open and closed embankments, using average climatic conditions over a 12-year period demonstrated that seepage flux rates from an open embankment are comparable to the seepage flux rates from a closed or covered disposal cell." This statement needs to be further discussed. One of the main purposes for the cover material is to prevent infiltration into the embankment. If the cover does not decrease the amount of infiltration into the embankment then the cover design should be redesigned. The way the cell is constructed should also be included in this analysis. When the final cover is on the embankment then water will drain away from the cell. During the construction of the Class A cell the center of the embankment was the low point for much of the construction. This means the water drained to the center of the cell for years. This means that millions of gallons of water was introduced into the cell over the past few years. It is also clear that the longer that the cell is left open the more water that is introduced into the embankment. Even if it does take a long period of time to reach the groundwater wells the open cell time should be limited to limit the amount of water that is introduced into the cell.
- 2) **Open Cell Requirements** – It has become very likely that EnergySolutions will not be able to meet the open cell requirements on the Class A cell. It will be near impossible that the 12 year limit can be met in this area and a violation will occur. Please refer to Attachment J for details of the open cell concerns. This amendment should address the affects of having the cell open for longer than 12 years. Please see attachment A.
- 3) **50 years of Unknown Contamination** – Page 3 states "potential contaminants in the groundwater would not reach a near by compliance monitoring well for roughly 50 years or more under this scenario." This is a positive as far as relaxing the sampling frequency but it is not helpful to understand failure of the constructed cells. The completed LARW cell cover is not performing to the expected level. It may be necessary to construct several monitoring wells closer to the embankment so that improper leaking can be detected earlier. It seems that the major areas of concern with the LARW cell are in the northeast corner and the southwest corner of the cell. Because of the mounding under the 11e.(2) cell it may be best to put additional wells along the east side of the LARW to better check for premature leaking of the cell. Please see Attachment B.
- 4) **Changes in 11e.(2) cell requirements** - ES is suggesting that they should change the constituents that they should be monitoring in the 11e.(2) cell area (pages 6 -9 of the

Statement of Basis). This may be a sound approach if the area was to be used for 11e.(2) waste disposal in the future. At the present time it is understood that ES may be asking to change a portion of the 11e.(2) cell to accept LLW. If this change is looming in the near future then changes should not be made at this time. Until a final decision is made on the kind of waste that is to be disposed in this area then changes should not be made. It also seems that the southwest portion of the site is not very stable when it comes to groundwater issues. There are still several unknowns about the groundwater in this area. Before changes are made in the classification of waste placed in this area, the groundwater issues need to be resolved. Issues that need to first be resolved include such things as the vertical gradient of the groundwater, the horizontal hydraulic gradient of the groundwater, the mounding issue, the source of surface water entering the ground, the possibility of an underground stream in the area, etc. Please see Attachment C.

- 5) On page 19 of the Statement of Basis it discusses the as-built reports and requires that ES to include a report of the capacity issues of their site. Included in this is the requirement to report the remaining disposal capacity. This is an important requirement. To determine the correct remaining capacity it is important that ES include the amount of cell space that will be required to be used by a) site cleanup, b) temporary cover, c) interim cover, d) cover over the clay liner and e) clean fill around CWF and other debris. At the present time the remaining cell space is approximately 1.9 million cubic yards. Of that amount 320,000 cubic yards is reserved for site cleanup, 200,000 will be used for temporary cover and interim cover, 50,000 will be used for cover over the clay liner, and about 230,000 cubic yards for clean fill around CWF and other debris. This means that the remaining capacity is just over 1 million cubic yards (or 29 million cubic feet). Including all numbers in remaining capacity is an important consideration for the State of Utah.
- 6) It is unclear whether updated data was used to evaluate the performance of the cells at Clive. For example the average temperature data can greatly affect the frost penetration analysis. Attachment D is a presentation on how data should be updated to better analyze the site.

## Attachment A - Open Cell Requirements

One of the main concerns is that the disposed waste is not exposed to the environment for long periods of time. The waste embankment is supposed to be covered with a temporary cover as soon as it reaches the top of waste limits. It seems that Energy Solutions is not completing this function as it should. This allows the wind and water to have more access to the waste and would create a situation where there is more potential for contamination.

There are other rules to limit the spread of contamination. To limit the amount of water that passes through the embankment while the cell is open to the environment there is a set rule that states that the cell can only be open for 12 years before the final cover is completed. The State of Utah seems to have program where they monitor the amount of time that a cell is open. Attachment 13-1 is an example of the "Class A Open Cell Time Limitation Report." This report is a good summary of the different times in which cell areas were opened. From this report it is easy to see when a certain area needs to be closed with a final cover. Attachment 13-2 shows a map giving the locations of some of the lift areas of the Class A cells.

One of the problems is that you cannot close a small portion of the cell and have it function properly. For example it seems that the first area where waste was placed in the Class A cell was in an area referred to as H12, H17 and H20 (Attachment 13-3). Waste was first placed there in 2000. Therefore the final cover needs to be completed over these areas in 2012. The problem is that you cannot just put a cover over these areas. Attachment 13-4 shows a rough sketch of what the cell would look like if you placed a cover just over this area. The water flow off of the embankment would be adjusted. Water would penetrate into the embankment and down through the waste so that the 12 year limit was violated. The only way to make the 12 year open cell limit work is to cover larger areas of the embankment.

Attachment 13-5 shows a plan where the different areas would be covered in larger sections so that the flow of water could be contained properly. This also would be much better for differential settlement between transition areas. This type of plan is the only type of plan that would work. This type of plan needs to be implemented immediately.

The reason that this is such a concern is that under the current plan the cells cannot be closed properly before the 12 year time expires. A look at Attachment 13-4 shows that at the end of 2006 the area over H12 has not been filled with waste. It is doubtful that is filled with waste even today. If you filled the area over H12 by the end of 2008 you could place the temporary cover over this material at that time. This waste column would have been placed quickly and would be next to an area where waste had been placed for about 5 years. This would mean that initial settlement would go on for at least 5 years. This is expected because of the data collected from the LARW cell. In five years the initial differential settlement may be done and then it will take about one year to construct the final cover. This means

that the cover cannot be completed properly until 2014. This would be a violation of the open cell limit of 12 years.

Therefore, even if work began to close this section right now there has to be a new plan to get the cell closed in 12 years. It may be necessary to surcharge the area. However, there is no data to know how much this will help in settlement efforts. It may be necessary to install some temporary synthetic liner to keep moisture out of the cell. The problem is that time has already run out and there is no proven way to close the facility properly.

A plan needs to be incorporated where the open cell requirement is tracked properly and issues are resolved in advance, not after there is a problem.

**ATTACHMENT B**

**Class A and Class A North  
Cell Reports & Cell Maps**

**Envirocare of -ah, LLC.**  
**Class A Open Cell Time Limitation**  
**Cell Report**  
**12/31/2005**

Cell ID	Date Opened	Current Activity	NW Coordinates		Area (sq.ft.)	Temp. Cover Date	Radon Barrier Slope Coverage					Final Cover Date	Side-slope Final Cover Date
			North	East			Top	North	East	South	West		
H12	10/18/00	Waste Placement	12,895	11,480	70,214								
H17	11/08/00	Top of Waste	12,880	11,945	47,716	Partial							
H18	11/08/00	Top of Waste	East 1/2 of H17		N/A	01/02/03							
H20	12/08/00	Top of Waste	12,880	12,262	53,175	01/02/03							
E12	01/15/01	Waste Placement	12,721	11,460	64,372	Partial							
E20	01/04/01	Top of Waste	12,729	12,270	56,264	11/15/01							
E22	01/04/01	Top of Waste	East 1/2 of E20		N/A	11/15/01							
E17	01/05/01	Top of Waste	12,730	11,966	51,214	Partial							
H16	04/19/01	Waste Placement	12,880	11,863	12,292								
C12	08/06/01	Waste Placement	12,562	11,460	67,248	Partial							
C16	04/25/01	Waste Placement	East 1/2 of C12		N/A								
C18	04/25/01	Top of Waste	12,561	12,062	80,339	10/02/02							
C20	04/25/01	Top of Waste	East 1/2 of C18		N/A	10/02/02							
E16	05/21/01	Waste Placement	12,730	11,863	17,276								
I9	08/01/01	Waste Placement	12,920	11,150	35,020								
F9	08/27/01	Top of Waste	12,712	11,151	48,399	Partial							
E6	09/17/01	Top of Waste	12,653	10,866	64,410	Partial							
B12	10/04/01	Top of Waste	12,450	11,460	42,581	Partial							
B14	10/29/01	Top of Waste	12,450	11,654	11,747	Partial							
B16	12/07/01	Top of Waste	12,450	11,864	45,101	Partial							
B15	12/20/01	Top of Waste	12,450	11,707	35,193	Partial							
B18	01/31/02	Top of Waste	12,450	12,062	61,765	10/02/02							
L12 (SW)	10/25/01	Waste Placement	13,187	11,456	10,000								
I6 (E)	09/11/02	Waste Placement	12,920	10,978	45,969								
I6(W)	11/25/02	Waste Placement	12,920	10,847	34,929								
A18	03/26/02	Top of Waste	12,336	12,062	65,485	10/02/02							
A19	03/26/02	Top of Waste	East 1/2 of A18		N/A	10/02/02							
L12 (SE)	10/28/02	Waste Placement	13,187	11,556	20,000								
C15	08/06/01	Waste Placement	Split from C12		N/A								
B6	07/02/02	Top of Waste	12,427	10,866	52,719	09/25/03							
C10	07/25/02	Top of Waste	12,491	11,151	55,721	03/25/03							
E4	10/14/02	Top of Waste	12,653	10,644	90,004	Partial							
B13	08/06/01	Waste Placement	Split from		N/A	Partial							
C4/E7	10/14/02	Top of Waste	South 1/2 of E4		N/A	01/17/05							
E1	01/13/03	Top of Waste	12,664	10,348	57,066	01/17/05							

**Envirocare of Utah, LLC.**  
**Class A Open Cell Time Limitation**  
**Cell Report**  
**12/31/2005**

Cell ID	Date Opened	Current Activity	NW Coordinates		Area (sq.ft.)	Temp. Cover Date	Radon Barrier Slope Coverage					Final Cover Date	Side-slope Final Cover Date
			North	East			Top	North	East	South	West		
D1	01/14/03	Top of Waste	12,467	10,345	64,725	01/17/05							
G1	05/02/03	Top of Waste	12,821	10,351	67,682	Partial							
H1	07/22/03	Top of Waste	12,891	10,386	33,053	Partial							
L6(north)	07/28/03	Waste Placement	13,320	10,904	10,000								
H11	08/13/03	Waste Placement	12,906	11,432	17,256	Partial							
L12 (remaining)	09/24/03	Waste Placement	13,360	11,456	66,745								
L15	10/15/03	Waste Placement	13,283	11,765	71,098								
L6 (remaining)	10/02/03	Waste Placement	13,320	10,904	26,529								
J18	02/14/04	Waste Placement	13,282	11,997	69,943								
L3	03/11/04	Waste Placement	Southeast section		10,000								
K19	03/25/04	Waste Placement	Split from J18 (east 1/2)		N/A								
J19	05/28/04	Waste Placement	13,288	12,192	51,770	Partial							
J21	06/14/04	Top of Waste	13,255	12,354	31,876	10/26/05							
L3 (central)	06/16/04	Waste Placement	13,140	10,618	20,002								
N20	7/26/04	Top of Waste	13,588	12,218	86,788	Partial							
I5 (I6 west)	7/19/04	Waste Placement	12,919	10,786	20,348								
N17	8/17/04	Waste Placement	13,588	11,923	90,047	11/15/05							
L5 (CLSM area)	8/23/04	Waste Placement	13,362	10,834	50,000								
L3 (N. Ext.)	10/29/04	Waste Placement	13,333	10,684	17,234								
I03	11/12/04	Waste Placement	Split from I5 & I6		N/A								
M17	12/1/04	Waste Placement	Split from N17		N/A	Partial							
I14 (Railcars)	12/18/04	Waste Placement	12,992	11,636	18,696								
I17	1/28/05	Waste Placement	12,992	11,828	46,247	Partial							
L3 West	2/28/05	Waste Placement	13,376	10,520	62,583								
(north)	3/5/04	Waste Placement	13,619	11,923	17,150	10/26/05							
N15	3/7/05	Waste Placement	13,616	11,753	58,518	Partial							
N14	4/11/05	Waste Placement	13,628	11,642	29,491	Partial							

**Envirocare of Utah, LLC.**

## Class A Open Cell Time Limitation

## Cell Report

12/31/2005

Total Area  $\boxed{3,031,536} \text{ ft}^2$

**KEY:**

- Lift Area = Unique alpha-numeric identification for each waste placement lift are
  - Beginning Date = Date of initial placement of the first waste lift or that lift area
  - Lift ID in Beginning Date Column Indicates Lift Merger
- FOR CURRENT ACTIVITY COLUMN**
- Waste Placement = Lifts for which top of waste has not been achieved or approved
  - Top of Waste = Lifts for which top of waste has been achieved or approved
  - Closure Construction = Lifts on which all clay radon barrier has been placed.
  - Closed & Covered = Lifts on which Cover Construction has been completed according to design specifications.
  - Closure Date = Approval date for the completion of the radon barrier
  - Cover Date = Acceptance date for construction of final design rock cover.
- (The year only is indicated for all cover completed prior to 2000)
- I/A = Not applicable  
I/C = Not Constructed

**Note:**

**-Lift areas listed are represented in attached drawing.**

**Envirocare of Utah, LLC.**

## Class A Open Cell Time Limitation

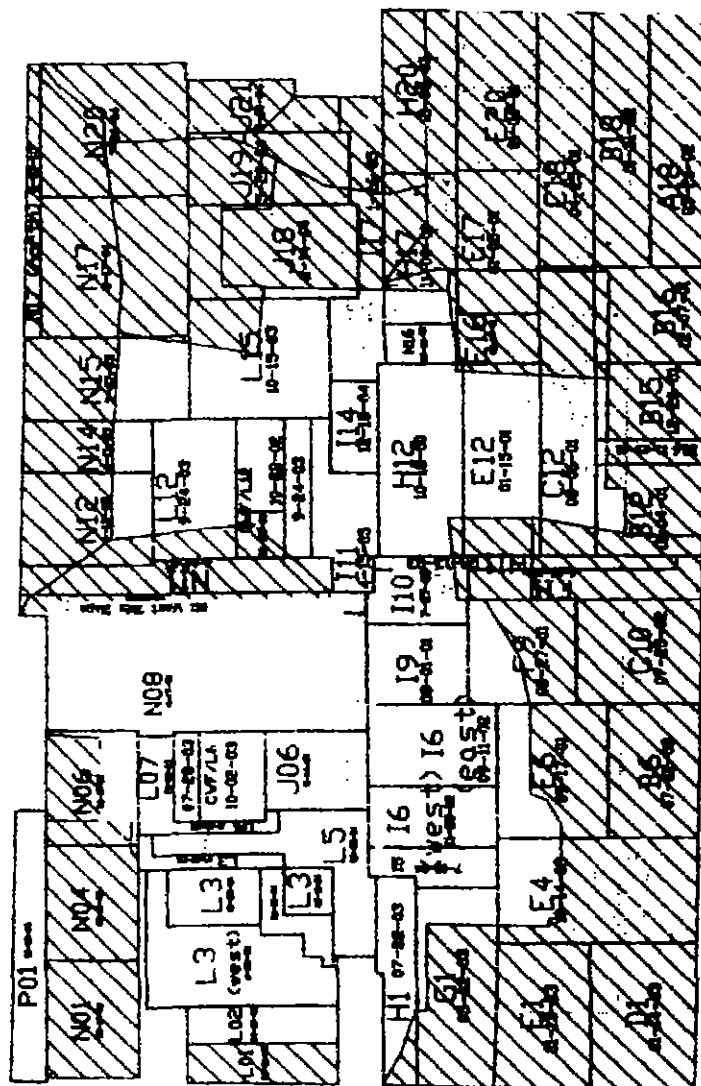
# Cell Report

12/31/2005

Cell ID	Date Opened	Current Activity	NW Coordinates		Area (sq.ft.)	Temp. Cover Date	Radon Barrier Slope Coverage					Final Cover Date	Side-slope Final Cover Date
			North	East			Top	North	East	South	West		
N12	4/12/05	Waste Placement	13,632	11,446	53,127	Partial							
N11	4/14/05	Waste Placement	13,634	11,385	43,068	10/06/05							
F11	4/15/05	Waste Placement	12,710	11,370	31,004	12/02/05							
L2	4/15/05	Waste Placement	13,293	10,442	24,066								
I11	4/20/05	Waste Placement	12,989	11,385	35,287								
F6	6/17/05	Waste Placement	Split from I5 & I6		N/A								
I10	7/27/05	Waste Placement	12,921	11,318	23,282								
N11 (West Side Slope)	7/28/05	Waste Placement	13,635	11,342	30,676	Partial Temp							
AWL01	8/1/05	Waste Placement	13,293	10,358	26,600	11/8/05							
AWG11	8/8/05	Waste Placement	Split from I10 & F11		N/A	Partial							
AWN01	8/10/05	Waste Placement	13,582	10,373	46,170	12/01/05							
AWN04	8/10/05	Waste Placement	13,582	10,616	45,790	12/01/05							
AWN06	8/10/05	Waste Placement	13,582	10,857	46,170	Partial							
CWF													
NWG8 partial (Class A North)	8/22/05	Waste Placement (CWF)	14,278	11,317	10,000								
AWL07	9/18/05	Waste Placement	13,397	10,910	12,903								
NWG3 Partial (CLASS A North)	10/18/05	Waste Placement (Large Component)	14,326	10,774	19,500								
AWJ06	11/14/05	Waste Placement	13,130	10,927	24,949								
AWN08	11/15/05	Waste Placement	13,580	11,100	162,787								
AWL06	11/18/05	Waste Placement	13,392	10,879	8,360								
AWH07	11/18/05	Waste Placement	12,980	10,927	10,073	Temp 12/2/05							
AWN09	11/26/05	Waste Placement	Split from AWN08		N/A								
AWN10	12/7/05	Waste Placement	Split from N11 (west)		N/A								
AWL03 (east)	12/12/05	C/S M Area	East of I3		10,259								

# CLASS A

Temporary  
Cover  
1,742,920 sf

**ENERGY SOLUTIONS**

# CLASS A

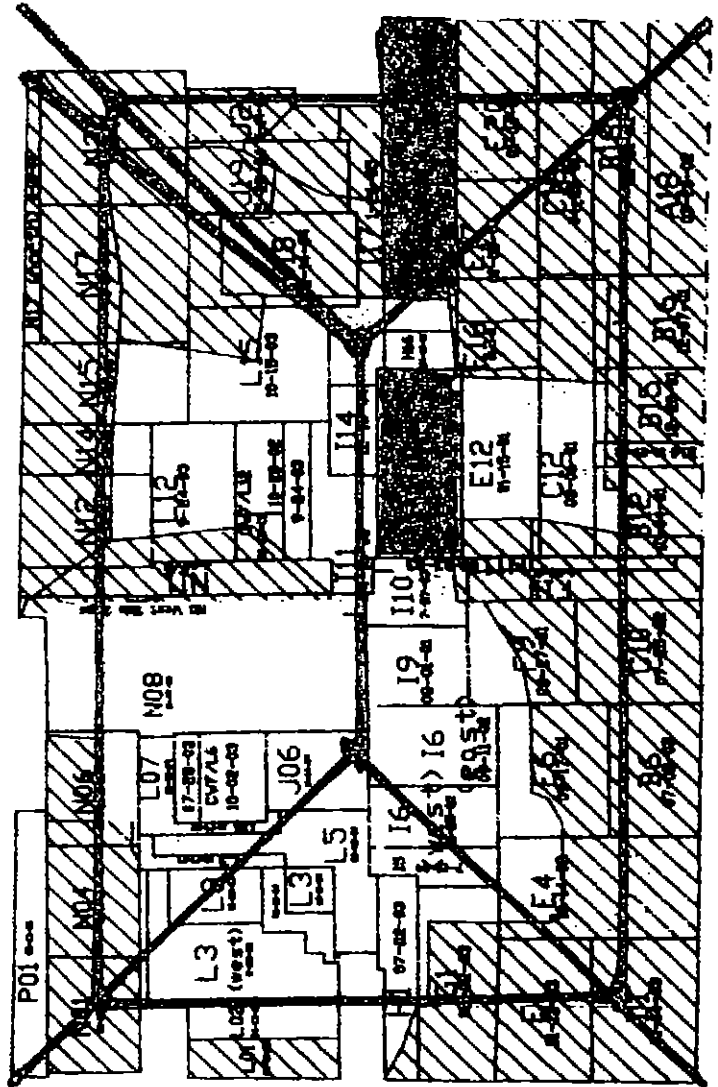
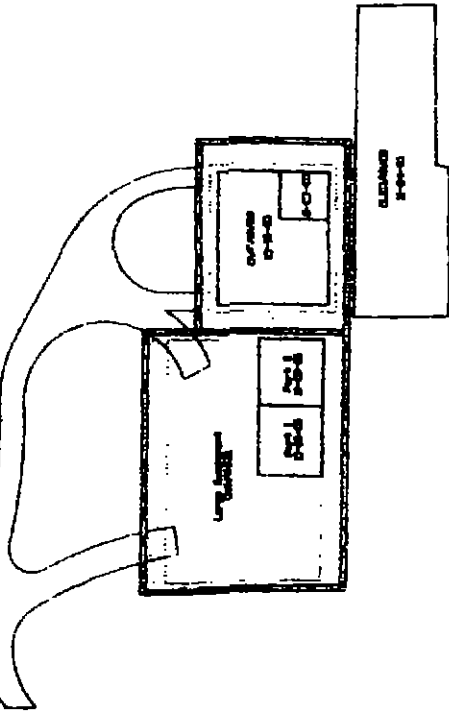
Attachment 13-3

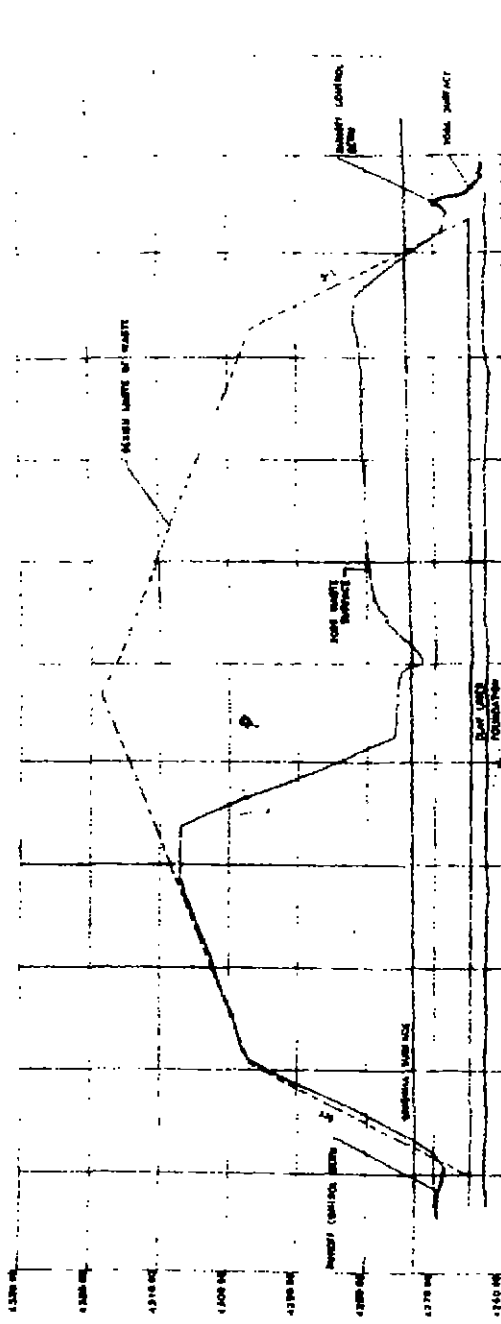
Temporary  
Cover  
1,742,920 sf



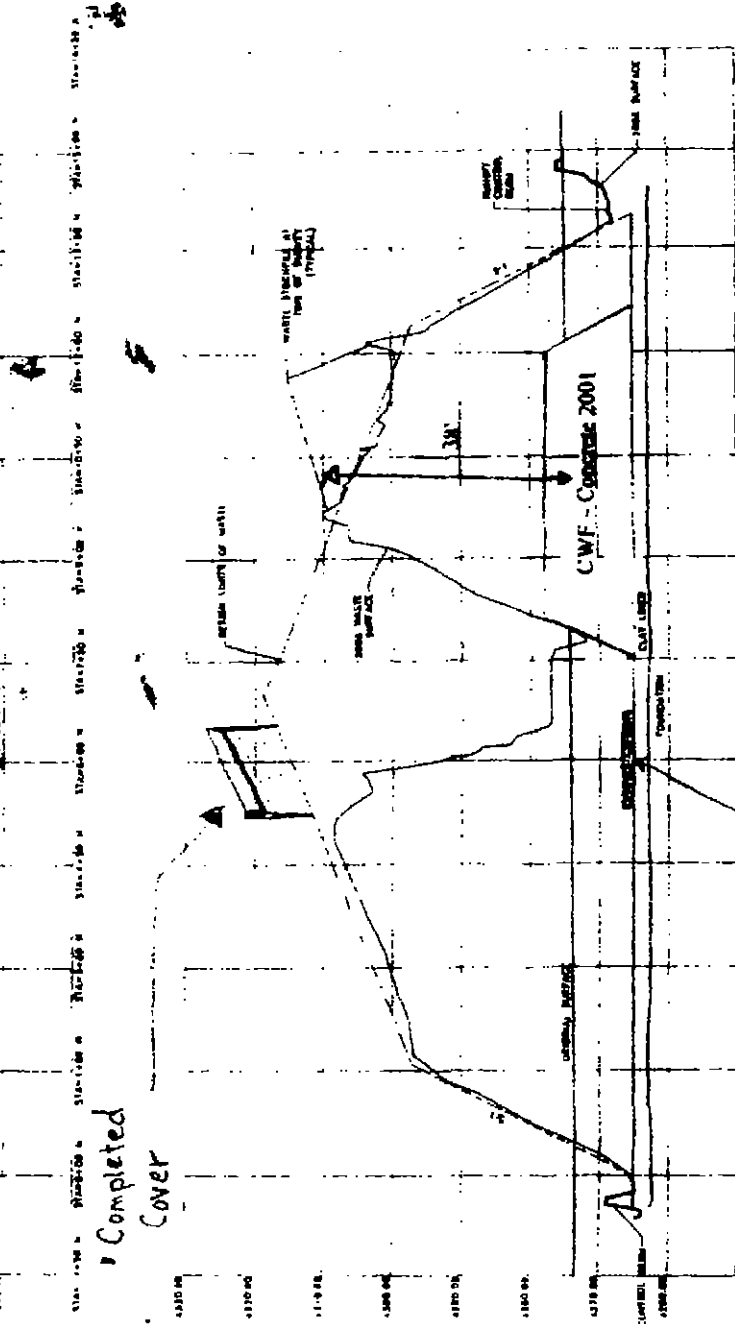
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ENERGYSOLUTIONS





Completed  
Cover



H12-Opened  
2000

STA=10+50 E

STA=12+00 I



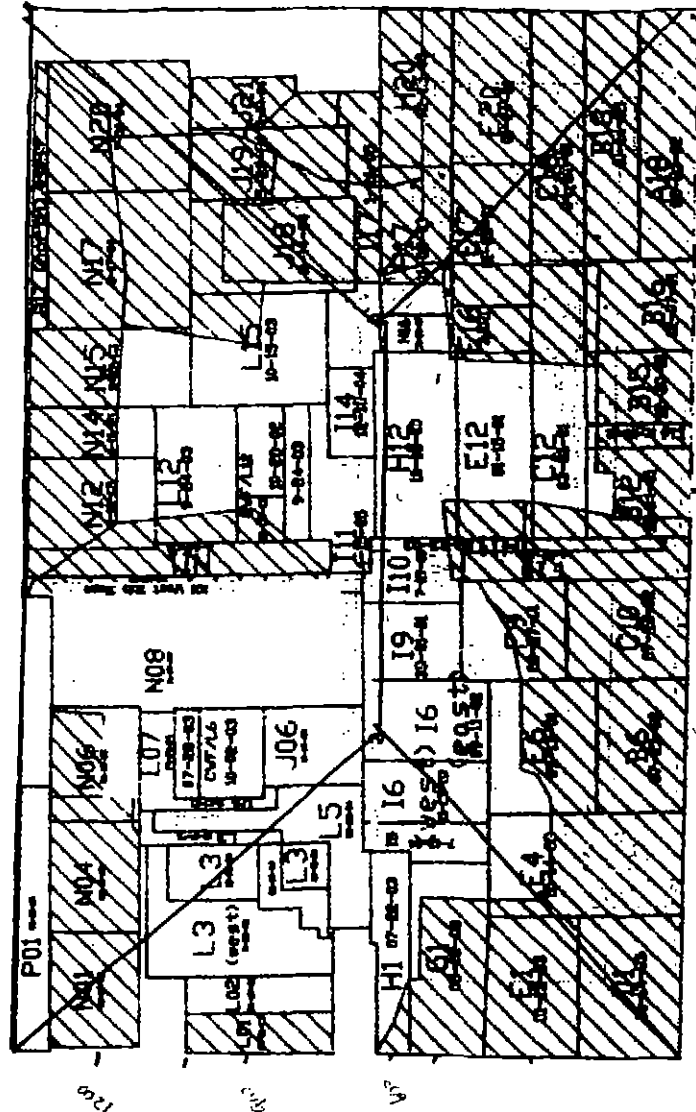
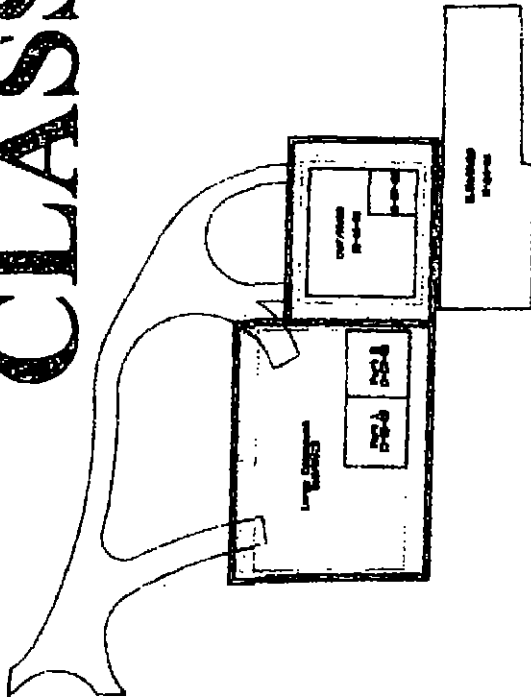
HORIZONTAL SCALE 1" = 100'  
VERTICAL SCALE 1" = 10'

Attachment 13-4

## Cover Area 2 – (2012)



# ENERGY SOLUTIONS



## Attachment B - Cover Failure

Attachment 7-1 is a map of the completed LARW cell at Clive. The map shows the contour lines as of the end of 2006. There are at least three areas of concern that can be seen just by looking at the contours. The problem areas are shown as Area A, B, and C. Attachment 7-2 shows a cross section of the cover system as it would have been constructed with the old design. The design allows for easy flow of water off of the embankment. Attachment 7-3 shows a cross section of Area C as it was at the end of 2006. In this area there is a section of the embankment that has shown slope reversal. The portion near the edge of the embankment is actually higher than a section of the embankment closer to the middle of the cell. The cross section shows the expected affect of this settlement on the layers of the cover below the rock erosion barrier. As the cover is now constructed the water that is collected in the filter zone begins to run toward the edge of the embankment. Instead of flowing off of the side of the embankment the water will pond and then increase the water infiltration into the radon barrier and also into the waste. The calculations of the amount of infiltration into the embankment do not account for the ponding of water on the top of the embankment.

To make matters even worse the new Class A and CAN cells are planning on using a new design which reduces the radon barrier from 7 feet to 2 feet. This creates a much more serious situation because a two foot drop in the surface of the cover creates a much more drastic result. Please refer to Attachment 7-4 to see the new design as it would be originally constructed. Now look at Attachment 7-5 to see what will happen if we have the same settlement issues in the Class A cell as we have already seen happen in the LARW cell (in 5 years, let alone 1000 years). After settlement similar to what we have already seen then water that flows through the lower filter zone will go directly into the waste. From there it will flow quite easily through to the liner which will also be cracked. From there the contaminated water will have a clear path off site. In other words, if we have the same type of settlement with the new design as we have seen in the LARW then we will have a complete failure of the cover system. One would hope that the new methods would be more effective than the previous methods; however this is not the case.

It is expected that we will see an even more dramatic effect from settlement in the Class A cell. Attachment 7-6 shows one of the many areas of concern in the Class A cell. If a line is drawn north and south along what is marked as the STA = 12 + 00 E line one can easily see that there are going to be huge settlement issues. Attachment 7-6(b) shows a cross section of this line. Included with this drawing is the location of H12 which was opened in the year 2000. The cross section also shows the huge concrete block marked as CWF Concrete 2001. One of the first thing that we notice is that the waste placement in this cross section is in direct violation of Energy Solutions permit. Energy Solutions LRA states on page 10 and 11 states "The cut and cover nature of the operation will preclude dramatic differences in waste column height and, accordingly, in settlement with the active embankment. The abnormal condition

considers possible effects of having a section of the embankment completed to cover height with an adjacent area of waste placement less than 25 feet high. ... The low height of 25 feet was chosen because this is the maximum calculated height of the embankment before preconsolidation stress is exceeded; in excess of this thickness, primary consolidation (settlement) begins to occur in the lowest layers of the embankment. This condition represents the maximum potential differential settlement for the liner." In other words the maximum difference in between areas where waste can be placed is 25 feet. Instead, Energy Solutions has constructed the cell with areas where the difference in heights of adjacent waste sections is 38 feet. (See Attachment 7-6 (red areas)).

Second the area of concerns in the LARW cell were at locations where the columns of waste were 25 to 30 feet in height. The area of concern in the Class A cell are at locations where the height of the waste will be 53 feet high. This means that the settlement would be expected to be twice as much in this area as in the LARW cell.

Third the area of concern will have the waste place very quickly. Energy Solutions themselves says that the reason that they had problems with settlement in their LARW cell is because they placed waste "quickly". In their 2006 Analysis of the LARW Settlement Monument Data they discussed why they "had differential settlement measurements ranging from 1.04% - 1.54%" that one of the areas was "located in the area of an old mobile waste cell that filled quickly, was closed quickly to meet year 2000 open cell requirements," Now they have even a bigger problem in the Class A cell. To meet the open cell requirements in this area the cell will need to receive over 40 feet of waste in less than two years. This will mean again that they are placing waste quickly to meet the open cell requirements.

The fourth area of concern is that in the LARW cell waste debris waste placed at either a 10 part soil to one part debris ratio or at least a 3 part soil to one part debris ratio. This was done to reduce the amount of differential settlement. In the new cell the ratios have now been changed to allow only one part soil to one part debris. This will again create more settlement than in the LARW cell.

The fifth concern is that the type of waste that is being accepted by Energy Solutions contains much more debris than the waste it accepted in the past. This added debris will decay, collapse, and be compacted more than the amounts of debris in the LARW cell. In addition, debris is now allowed in more portions of the embankment than in the past. There is only 1 foot of debris free waste required between the waste and the radon barrier. In the past debris was only placed in the bottom 2/3 of the embankment. This means more areas of debris in the embankment and more potential settlement, especially differential settlement.

So now let's review what Energy Solutions and the DRC agreed to do to try to make the settlement issue less of a concern. Back in 2003 Envirocare started using the new design and new ways to place wastes. They knew there were problems so they started working on ideas to improving the settlement problems. The idea was a step in the right direction. By August of 2005 a new approach was taken. It included three changes; 1) to install a temporary cover system that included settlement monitoring and 2) installing a shredder and rubbleizer to process all of the debris before it was placed, and 3) the use of surcharge materials to speed up settlement. The three solutions have provided little help and in fact have only created more violations and more issues.

- 1) TEMPORARY COVER PLAN - The temporary cover plan is attached as part of Attachment 7-7 as part of a August 1, 2005 submittal from Envirocare. It states on page 3 "As waste areas become "topped out", temporary cover and settlement monuments will be installed and monitored as a step in preparing for permanent final cover." The temporary cover was to provide a place to install the settlement monitors and also provide three other important functions; prevent direct contact with the waste by personnel, reduce infiltration, and prevent potential airborne dispersion of the waste. Monthly inspections were to be conducted to check for erosion gullies and if gullies were found they would be reported in 5 working days.

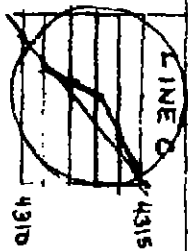
All seemed to think that this was a great plan. Energy Solutions submitted reports to the State suggesting that they were incorporating this very important plan to monitor settlement, prevent erosion of the waste, prevent windblown material and prevent direct contact of waste with personnel. Attachment 7-8 is a submittal from Energy Solutions showing areas of Temporary Cover. Finally in May of 2007, after CME began to ask questions about the "canyons" in the Class A embankment the DRC requested some information from Energy Solutions about the temporary cover and the pre-final cover settlement monitoring. Three months later, the response came from Energy Solutions, Attachment 7-9 page 2 contains a shocking revelation from Energy Solutions, "Erosion monitoring was not performed in 2006. Because the temporary cover has not been constructed and settlement monitoring has not begun in the Class A cell, erosion monitoring is not required....." Energy Solutions will address Class A pre-final cover settlement monitoring in the annual settlement report, once monitoring begins." So here we are, years later with no implementation of the temporary cover plan, no settlement monitoring data, no way to prevent direct contact with the waste by personnel, no way to reduce infiltration, no way to limit airborne contamination, no inspection done of the open waste pile. The temporary cover plan is a complete failure. Energy Solutions is in direct violation of many areas of it's license and yet the DRC seems to have done nothing

2. USE OF SURCHARGE PILES – this is another great idea but it has never been used. In fact the opposite has been done. Piles of waste material have been placed randomly on

top of the pile that have encouraged settlement in these random areas instead of areas where it would really be helpful. The surety only has monies for 500 linear feet of surcharge materials even though there are many feet of areas that will really need surcharge when they are brought up to grade quickly. Please note the areas on Attachment 7-6 (red areas) where there are canyons between waste piles.

In summary the work that Energy Solutions has tried to do to improve the settlement concerns in the new cells have not helped much, if any at all. Instead there are many reasons to predict that the settlement issues will be even greater in the new cells than in the already constructed LARW cell. This will create major problems in conjunction with the new proposed 2 foot radon barrier. There is little doubt that unless something is done that the new cover systems will fail drastically.

1 2

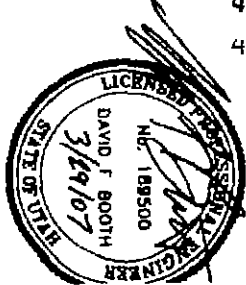
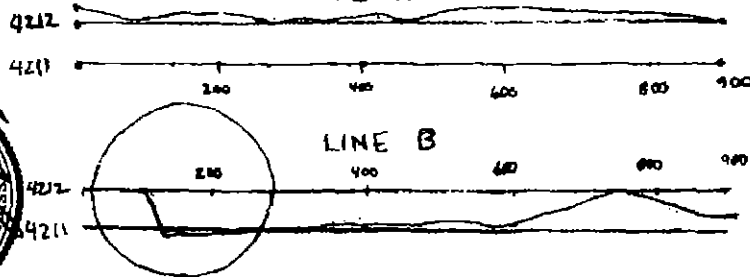
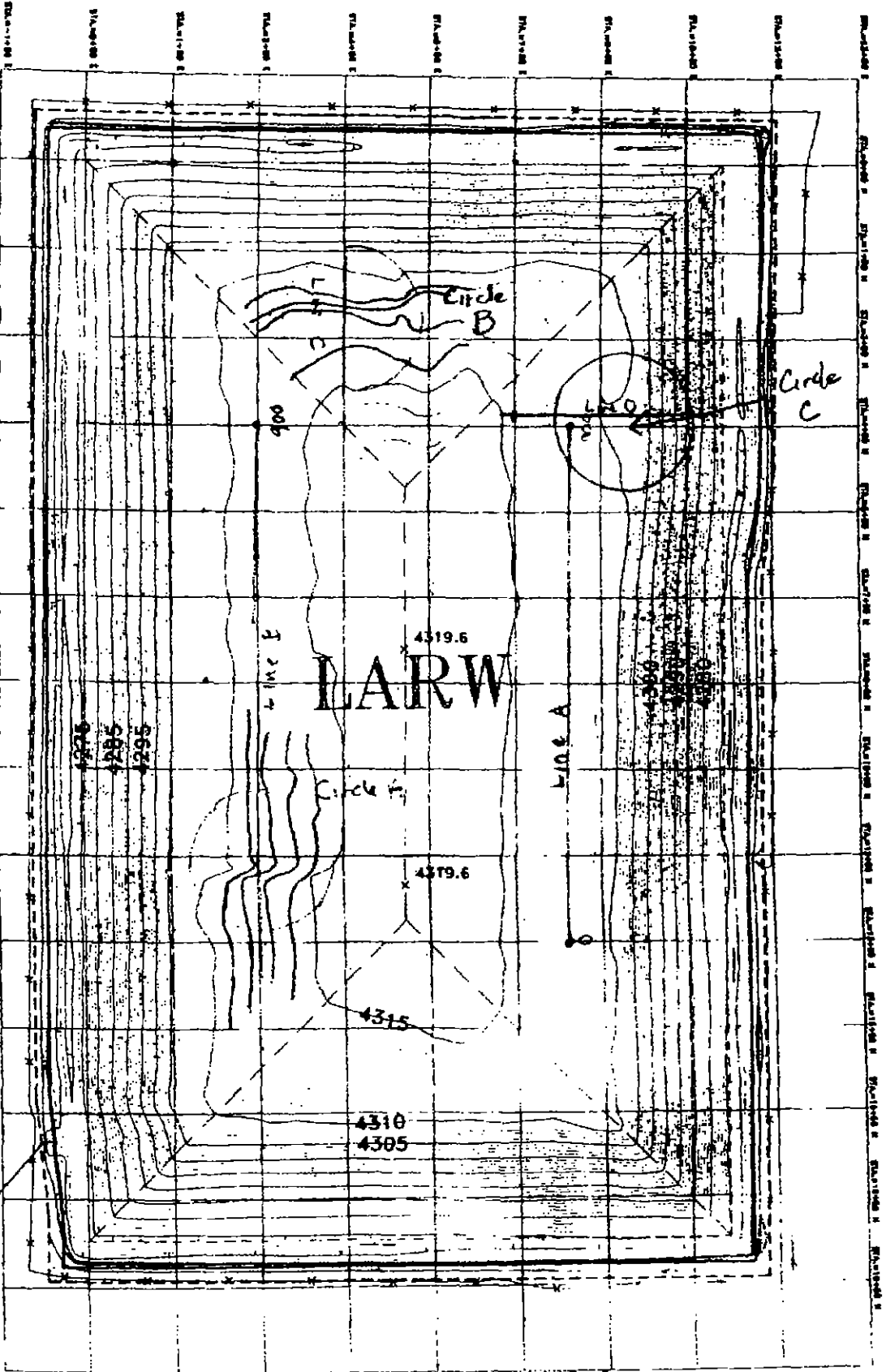


LARW EMBANKMENT  
100 50 0 100 200



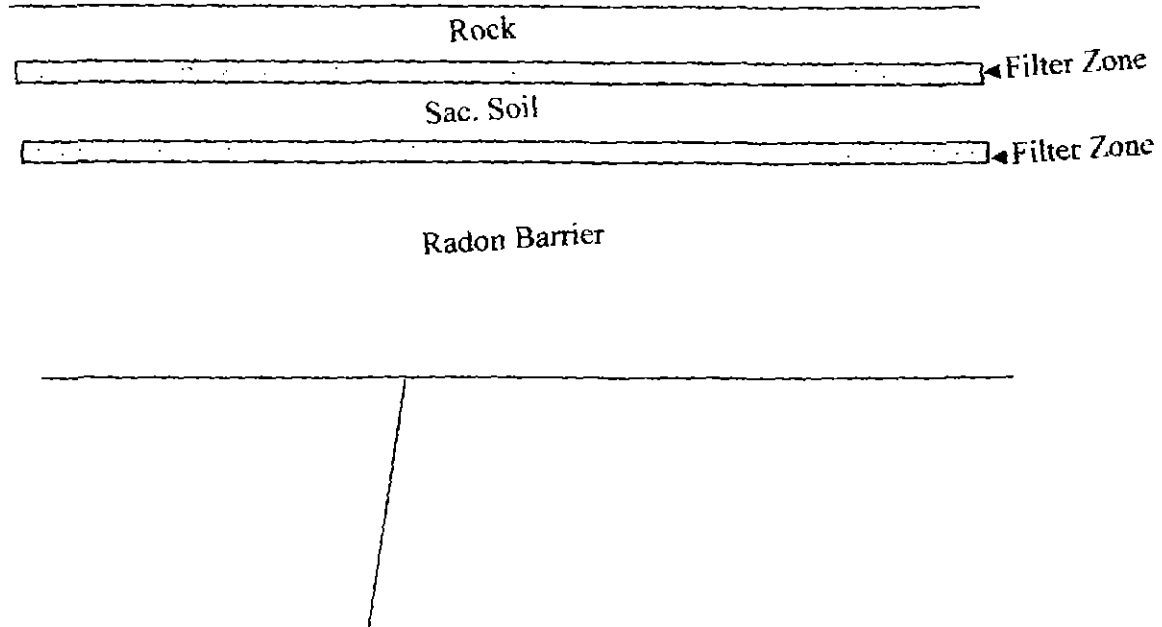
DRAINAGE DITCH  
TO 11423

- LEGEND
- LIMIT OF WASTE
  - EXHIBITANT EARTHWORK BREAK 1
  - PERMITTED EXHIBITANT WASTE IN
  - ROCK COVER LIMIT
  - EDGE OF CONSTRUCTED LINER
  - FENCE



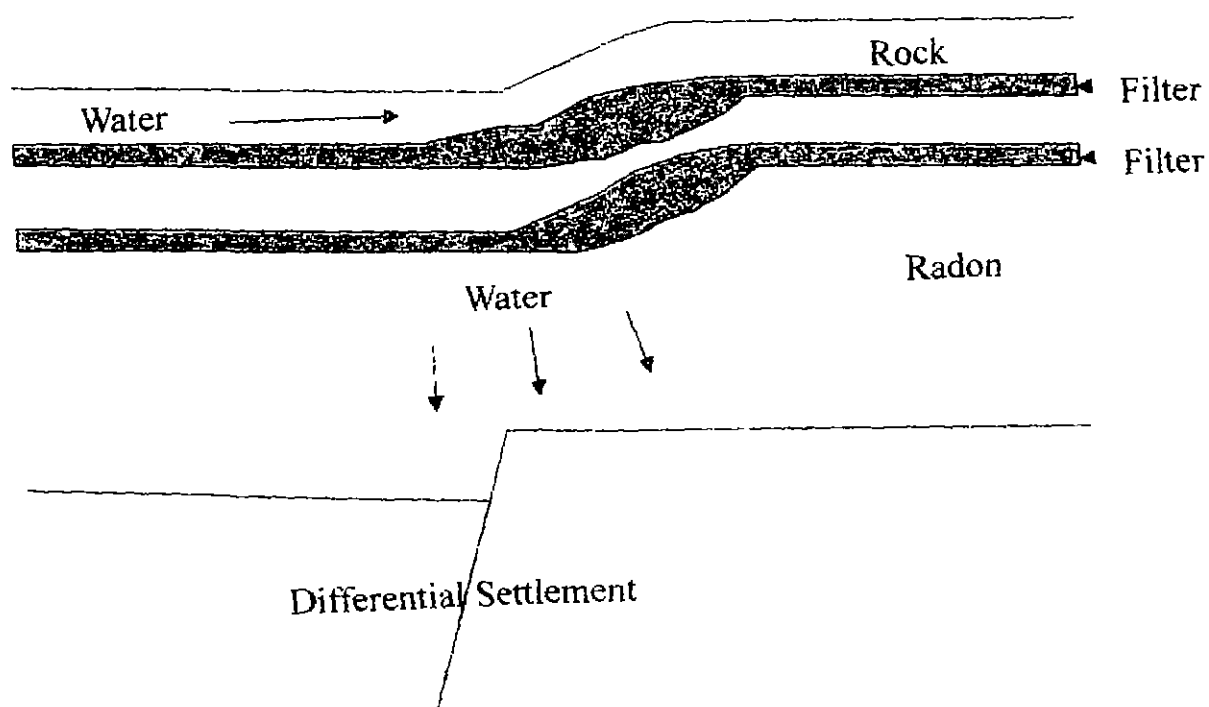
## Attachment 7-2

### LARW Cover Design



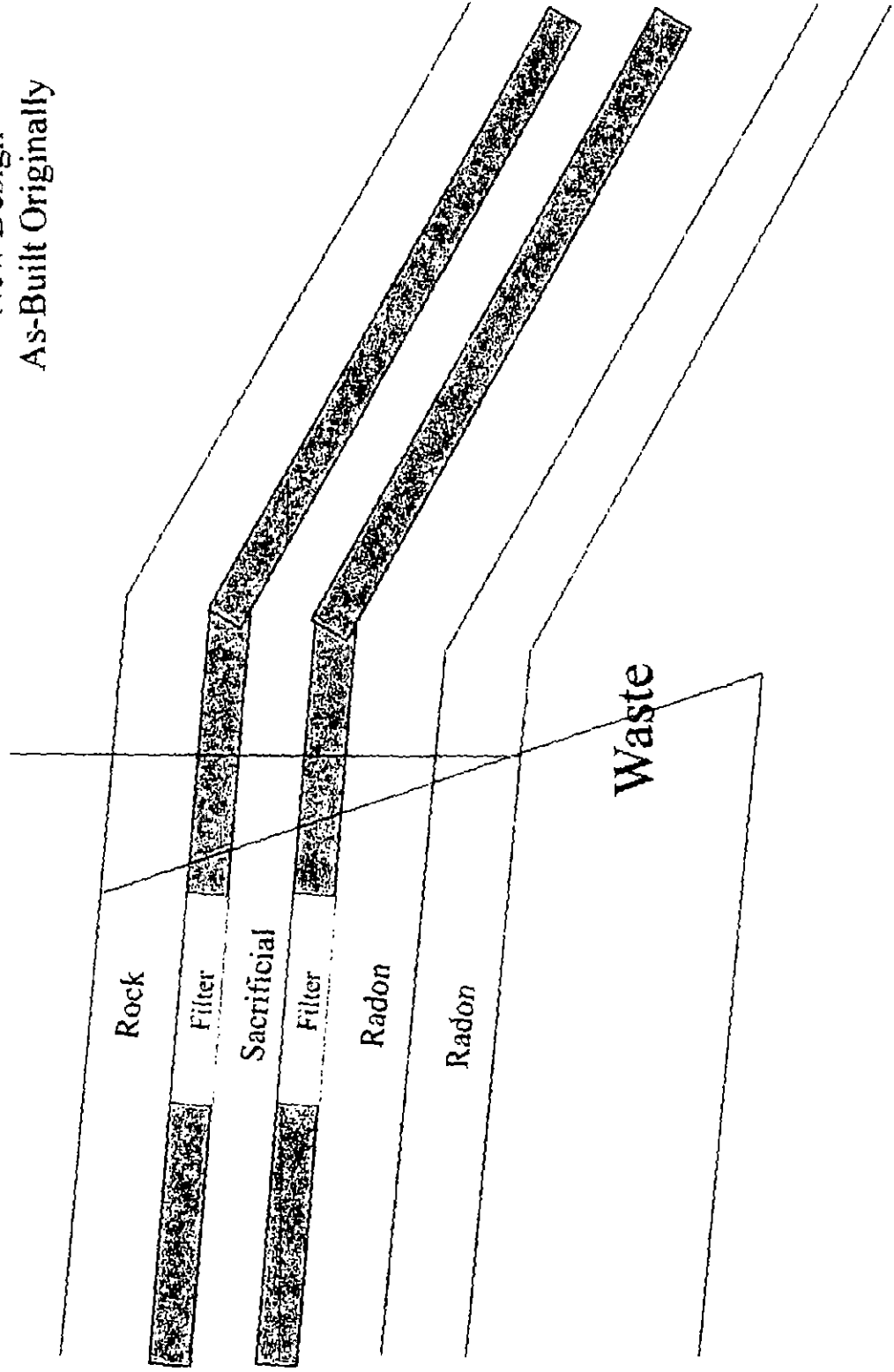
Attachment 7-3

Area C as of 2006

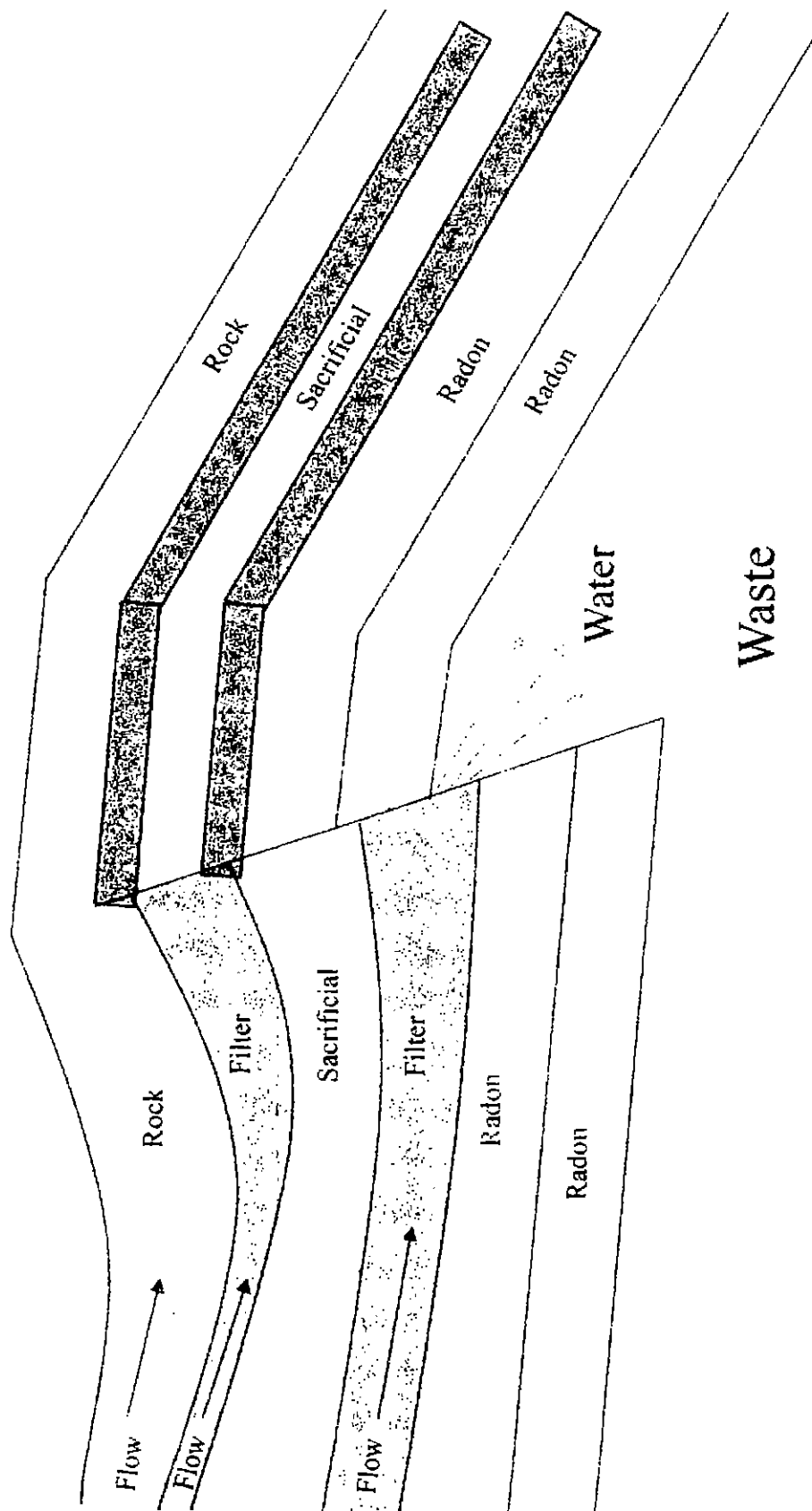


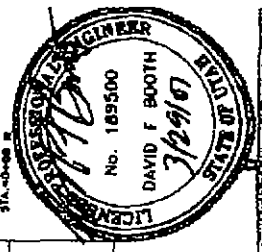
Attachment 7-4

New Design  
As-Built Originally



Attachment 7-5  
New Design  
After 5 Years

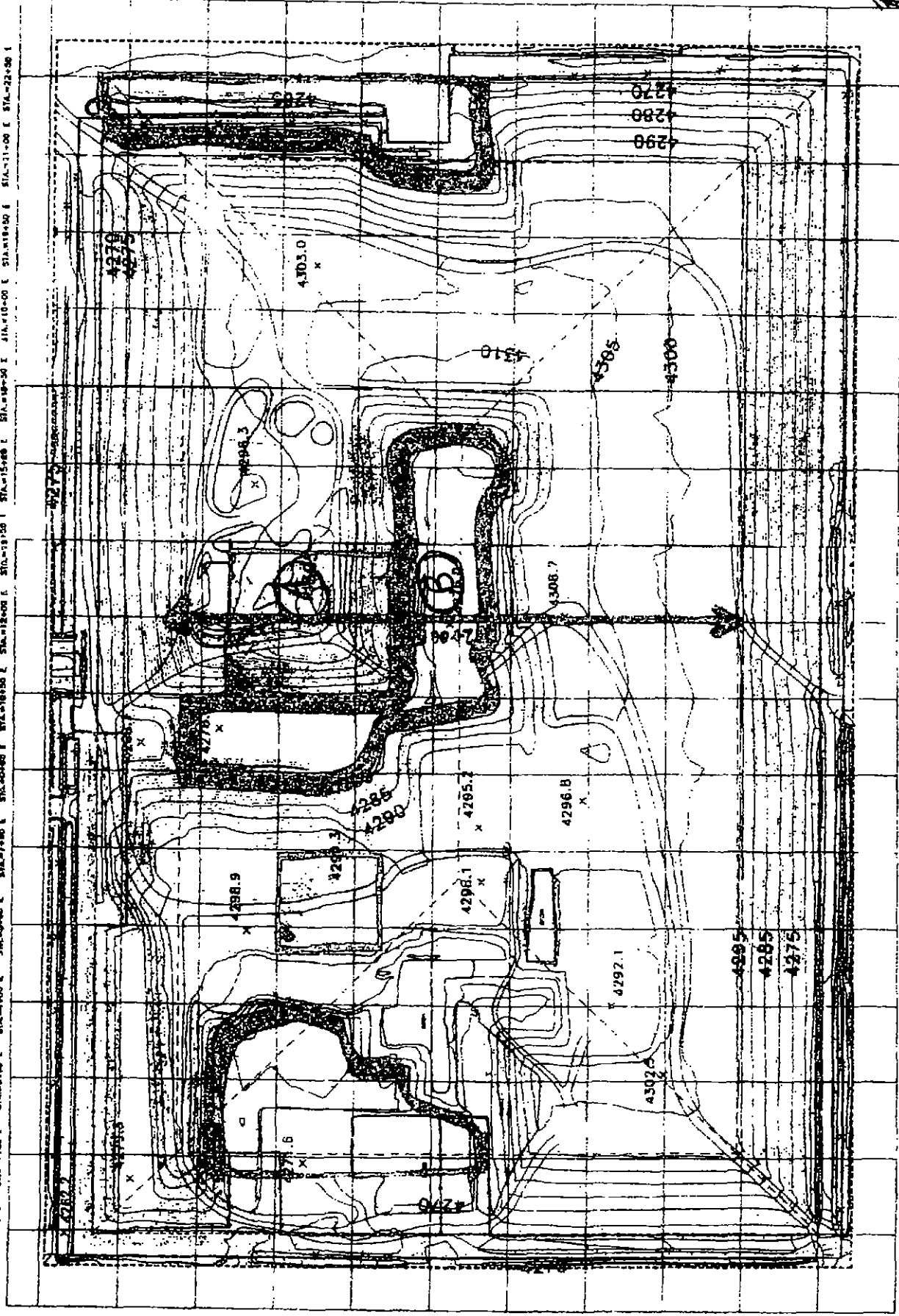


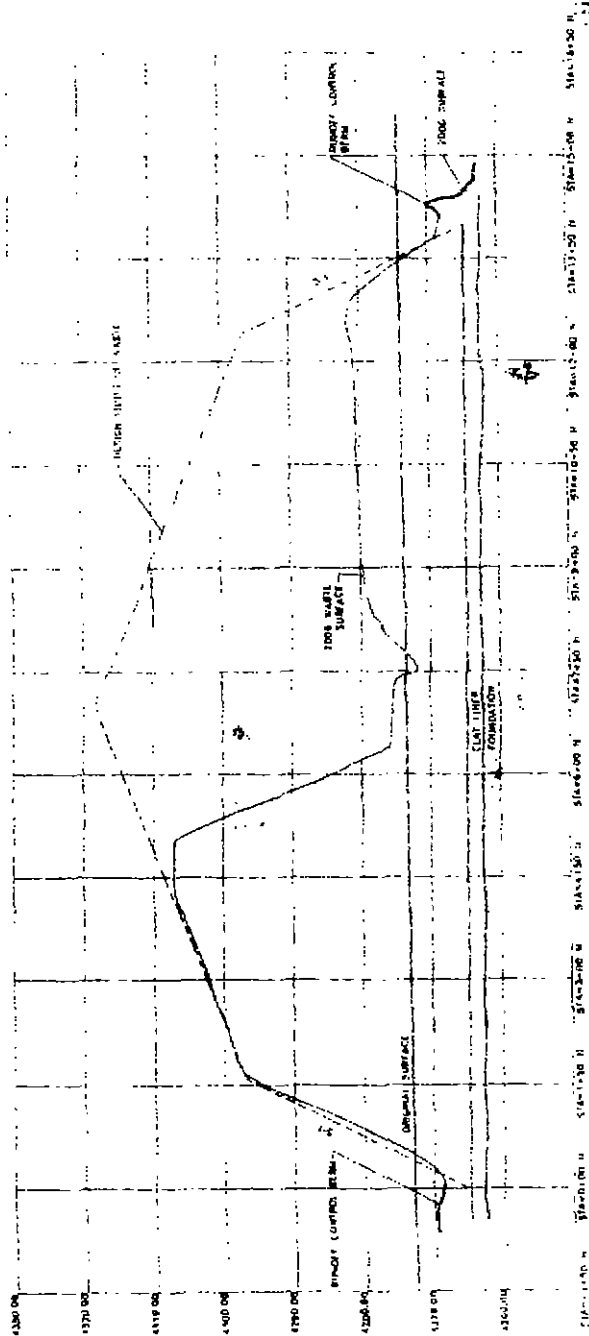


Attachment 7-6

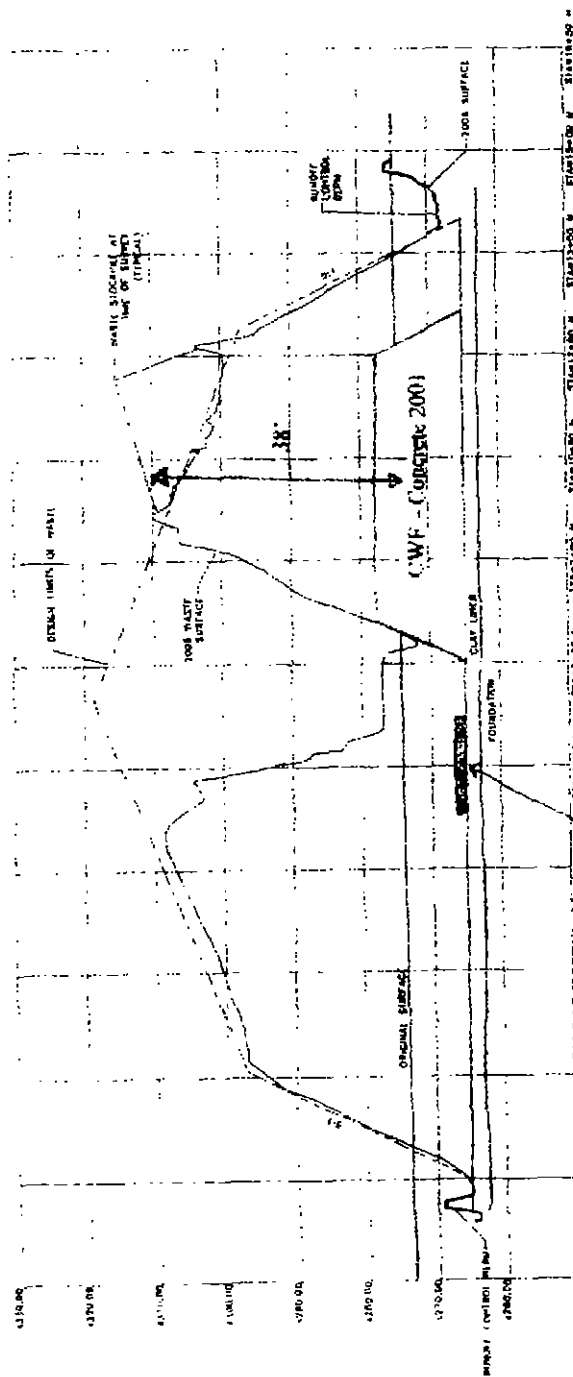
CLASS A EMBANKMENT  
100 50 0 100 200

- LEGEND**
- PERMITTED EMBANKMENT WASTE LIMITS
  - EMBANKMENT EARTHWORK BREAK LINES
  - EMBANKMENT LIMITS
  - EDGE OF CONSTRUCTED LINE
  - FENCE
  - 200' EDGE OF WASTE





STA=10+50 I



STA=12+00 I



HORIZONTAL SCALE 1"=100'  
VERTICAL SCALE 1"=10'

Attachment 7-6(b)

11/2-Opened  
2000

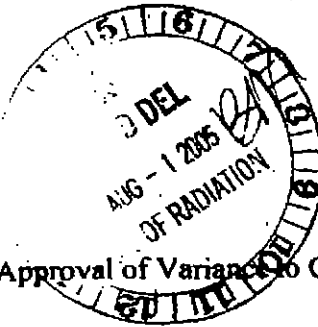
5.65

3.62

CD05-0377

August 1, 2005

Mr. Dane Finerfrock  
Executive Secretary  
Utah Radiation Control Board  
P.O. Box 144850  
Salt Lake City, Utah 84114-4850



Re: June 9, 2005 Conditional Approval of Variance to CQA/QC Compaction Requirements

Dear Mr. Finerfrock:

In a letter dated May 25, 2005 (CD05-0270), Envirocare of Utah, LLC (Envirocare) requested that the Division of Radiation Control (DRC) review proposed revision 19a to the LLRW CQA/QC Manual as well as provide a variance to the current CQA/QC Manual to permit implementation of the proposed waste placement method. In a letter dated June 9, 2005, DRC provided conditional approval of the variance.

As a condition of the variance, Envirocare committed to responding to several items, including:

- W • Schedule for installation of the shredder and rubbleizer
- W • Temporary cover plan
- J • Settlement monitoring report
- J • Future settlement monitoring plan
- J • Surcharging analysis

Attached please find a report addressing each of these items. Please contact me at 532-1330 with any questions regarding this submittal.

Sincerely,

for   
Tye Rogers

Vice President of Compliance and Permitting

enclosure

cc: Loren Morton, DRC (w/ encl.)  
Woody Campbell, DRC (w/ encl.)



ENVIRO CARE OF THE  
WASTE AND SOLID WASTE

## Engineering Department

# Memorandum

**To:** Dan Shrum, Sean McCandless  
**cc:** Tye Rogers,  
**From:** Steve Newton, P.E.  
**Date:** 7/28/05  
**Subject:** Response to DRC Letter Dated June 9, 2005

Presented below is a response to the Conditional Approval of a variance to the compaction procedures in the currently approved CQA/QC Manual. The responses are organized in the same manner as listed in the DRC letter.

### Rubbleizer & Shredder Schedule

Envirocare has purchased a Komatsu 550 mobile crusher. This equipment is currently on site and being used in a test mode and for crushing rock in the unrestricted area. We anticipate the rubbleizer will be moved into the restricted area by August 31 for processing concrete type waste materials. Since it is a mobile piece of equipment, the location of the rubbleizer will shift along with the active waste placement area; however, the rubbleizer will always be located on protective material and above approved liner.

A Newell 120104 MegaShredder metal shredder was recently ordered and is being prepared for shipment to the Clive facility. Attachment 1 provides information about this equipment. Power system options are still being evaluated and will be decided upon soon. The shredder and power systems are major long lead time items, with the electric motor for the shredder having a 38-week lead time. The electric motor lead time is a firm date, and attempts to expedite that schedule have not been successful. In order to prevent potential delays in this 38-week lead time, the motor supplier will be subjected to expedited damages for any delays in motor delivery. The shredder facility design process has begun, and once the layout is complete, drawings will be submitted to the DRC. The estimated schedule for this piece of equipment and the supporting systems is presented below.

Submit shredder facility layout to DRC	September 15, 2005
Delivery of shredder components	August, 2005 to February, 2006
Site preparation	September to November, 2005
Complete shredder foundations	January, 2006
Complete shredder mechanical systems	March, 2006
Motor delivery	April 24, 2006
Motor installation and facility start-up testing	May, 2006
As-built report to DRC	June 1, 2006
Shredder placed into service	July 1, 2006

## **Temporary Cover Plan**

### **Background Discussion**

Our proposal and supporting rationale for placement of temporary cover is presented below. The proposal described herein is a component of our modified waste placement concept which involves reducing the overall area of waste placement activities compared to our past disposal practices. The new approach involves two active bulk waste placement areas. CLSM of large components and other items that may not be suitable for shredding and CWF will continue to be constructed as distinct waste placement approaches in separate areas. The main placement area will be used for all soil and debris wastes except material judged to be too wet for compaction. A second "wet waste" placement area will be available for drying and/or blending to make the wastes suitable for compaction. The size of each of these two areas will be between 150,000 and 250,000 square feet. The wet waste area may be used for general waste placement when there is no need to process wet waste material.

In general, the intent is to place waste in a systematic manner such that permanent embankment cover can be placed as soon as possible. A second goal is to build the embankments such that the open cell area is minimized and that the cell can be closed with a minimum of rework. To accomplish this Envirocare intends to complete the base of the current Class A cell, and bring all waste lifts up to the current design top of waste limits. Based on the current configuration of wastes within the cell, the remaining areas to be filled are the two "canyons" and in general the north side of the Class A embankment. [REDACTED]

If and when the proposed height of waste increase has been approved for the Class A Combined embankment, the next and final major level of waste will be placed from the south, progressing to the north. As waste areas become "topped out", temporary cover and settlement monuments will be installed and monitored as a step in preparing for the permanent final cover.

### Temporary Cover

Envirocare proposes to place temporary cover over waste areas that have reached the current permitted top of waste elevation. The purpose of the temporary cover will be to provide a surveyed surface for installation and monitoring of settlement monuments. The temporary cover will also prevent direct contact with the waste by personnel, reduce infiltration, and prevent potential airborne dispersion of the waste. Performance criteria for the temporary cover material and placement process would require that the material should not be readily eroded by wind or rain, and that the material should be compatible with the final cover system. This may be accomplished by the top foot of debris-free native soil called for in the current CQA/QC Manual, as further defined below.

The proposed temporary cover placement procedures are as follows:

1. Grade the waste surface to the design top of waste slopes and elevations allowing room for the temporary cover system.
2. Place debris-free native soil material as temporary cover over the graded areas when a sufficiently large area is ready for cover (typically in 50,000 SF minimum lots). Suitable materials will consist of any native soils except those that are predominantly sand.
3. The temporary cover will be placed as a single 12" compacted layer. This layer will serve as and be designated as the last foot of "debris free waste".
4. Compaction will be performed and tested in accordance with the criteria for waste placement, as described in the CQA/QC manual.
5. Monthly inspections will be conducted to check the depth of erosion gullies. If the inspections indicate that any wastes are exposed by erosion gullies, the temporary cover will be repaired in those areas within 5 working days.
6. Temporary cover maintenance will be performed on a bi-annual schedule and will consist of filling in any erosion gullies, and if necessary, placement and/or regrading of clean cover to prevent ponding on the temporary cover.
7. The edges of temporary cover will be marked with fencing, rope, snow fence, or other equivalent means to prevent heavy equipment travel on the temporary cover surface.
8. Since the final cover will be constructed over the temporary cover, no transitions at this interface will be necessary. However, each layer of the final cover will be stepped back to facilitate the future tie-ins.

Attachment 2 provides draft CQA/QC language for a new Work Element – Temporary Cover Placement and Monitoring. This draft is presented as revision 19d, building upon draft revision 19c submitted on July 19, 2005.

## **Settlement Monitoring Report**

This section provides a discussion and interpretation of available settlement monitoring data and settlement predictions for embankments at the Clive Facility. Settlement data is available only for the completed portions of the LARW embankment, with data collection beginning in October 1999.

The interpretation presented herein is based on a recent combined embankment study performed by AMEC Earth & Environmental<sup>1</sup> that was submitted to the DRC on May 27, 2005, in support of the proposed Class A Combined disposal cell. AMEC had access to the first four sets of data, which included annual elevation surveys performed on October 22, 1999, February 13, 2002, February 27, 2003, and January 23, 2004. They also had access to other survey data that was collected between the annual surveys. The most recent survey was performed on February 25, 2005 but this data was not available for AMEC when they were conducting their study. The most recent data has been included in the supplemental settlement evaluation discussed below.

Settlement of earthen materials is derived from three sources: (1) elastic compression which occurs immediately as material is placed; (2) consolidation settlement which occurs over a short period to a number of years; and (3) secondary settlement which occurs over many years. These types of settlement apply in varying degrees to both the waste column and the foundation soils. Further discussion is provided below, in the context of the site specific conditions at the Clive facility.

AMEC organized their report by two types of settlement: 1) settlements of the embankment and foundation due to loading of the foundation and 2) self-weight (compression) of the embankment materials themselves. In terms of final cover performance, AMEC indicated the most important portion of these settlements is the settlement that may occur after the final cover is placed.

### **Settlement Mechanisms**

As a lead in to the settlement discussion, it is important to understand how the embankment materials (wastes) and foundation soils react to the pressures imposed by the waste. Since elastic deformations occur at the time of waste and cover placement, they do not contribute to future settlement of cover systems and are not discussed further herein.

The magnitude of settlement resulting from consolidation processes depends on the properties of the clay layers or clay like wastes, and the applied load conditions.

<sup>1</sup> Geotechnical Study, Increase in Height and Footprint, Envirocare LARW Facility, May 27, 2005

Consolidation settlement begins once a load is applied to a saturated or near saturated clay system. Initially the load is supported by both the clay structure and water pressure that is developed within the voids between the clay particles. Consolidation takes place as the trapped water, which is under pressure from the applied loads, is slowly expelled from the voids between clay particles.

At the time of initial loading, the rate of water expulsion (consolidation) is at its highest because the water pressure is at its highest. However, this release of excess water pressure from the clay voids is slow because clays have low permeability. As the water is slowly expelled from the voids the applied loads are increasingly shifted to the clay structure, and the decreasing water pressure is accompanied by a decrease in the rate of consolidation.

The rate and length of time of settlement (consolidation) is largely influenced by the length of the paths that the trapped water must take to exit from within the clay layers. A thick deposit of clay that has intermediate thin drainage layers such as silt and sand stringers, will allow the water to exit rapidly. As will be discussed below, the subsurface conditions at the Clive facility and the settlement data to date indicate relatively quick consolidation of the soils and waste at the facility.

A third form of consolidation is referred to as secondary consolidation (which is in addition to the initial elastic compression, and primary consolidation) and this occurs long after the excess pore pressures have been dissipated. This component is usually smaller than primary consolidation and occurs as the clay particles slowly deform like plastic. Like primary consolidation, the rate of secondary consolidation decreases exponentially over time.

### Subsurface Conditions

AMEC reviewed historical records, including the Vitro subsurface characterization, as part of their analyses for seismic and settlement evaluations for the Class A Combined embankment. In addition they commissioned additional Cone Penetrometer Testing to corroborate the past characterizations and to obtain a higher level of detail of the various layers within the main stratigraphic units beneath the embankments.

AMEC's review of the subsurface soils below the Clive facility indicates the soils are "sufficiently uniform that a single characterization is appropriate for either the individual or combined embankments." This alleviates any concern that there may be differential settlement due to a variable foundation condition. AMEC also indicates that characterizations and laboratory testing performed for Envirocare were consistent with the Vitro subsurface characterization.

Four subsurface units have been described in past studies and two units (# 4 and 2) have the potential to contribute to consolidation settlement. It is those two units that contributed to the predicted settlement in AMEC's analyses.

### AMEC Conclusions on Foundation Settlement

AMEC points out that "Since the survey monitoring data could potentially be measuring both foundation and embankment settlements, the important aspect of calculating the foundation settlements was to identify the time required for the foundation settlements to be complete." AMEC performed their analysis using site specific consolidation test data and the FoSSA settlement analysis program which was used to model the four units and to also predict elastic and secondary settlements.

Their analysis indicated that foundation settlements will be on the order of 8 to 12 inches for the current embankment designs and 12 to 16 inches for a 50 foot high (at the slope breakover) combined embankment configuration. This magnitude estimate included the immediate elastic and short term consolidation components. Their interpretation of the site specific test data also indicated that about 95 percent of the consolidation would be complete within one year, or occur as the embankments are constructed. This relatively quick consolidation is due to the presence of favorable interlayering of drainage paths within the clay units, and the general absence of clay-like waste material.

AMEC also analyzed secondary consolidation by modeling this component over a 500 year period. They predicted that an additional 8 inches of long term settlement would occur during that period. Therefore, although approximately two feet of foundation settlement is predicted, ~~2/3 of this would occur within one year of placement.~~ Furthermore, because of the broad uniformity of the foundation soil layers across the site, settlements of the foundation system would also be broadly uniform and not contribute to differential settlement of the cover systems.

### AMEC Conclusions on Waste Column Settlement

AMEC indicated that the existing LARW embankment measured settlement data include contributions from both foundation settlement and waste column settlement. The proportion attributed to each cannot be distinguished from the settlement data alone. Observations by AMEC include:

1. The rate of settlement decreases significantly in a 12 to 24 month period.
2. Foundation settlements and the elastic component of waste settlement are essentially complete by the time the final cover system is complete. Therefore, in general a majority of the movement that is registered by the settlement monuments would be considered as waste settlement.
3. ~~The total magnitude of settlement over 4+ years is typically less than 0.75 feet.~~
4. ~~Given a maximum settlement of 0.75 feet and that settlement monuments are located about 100 feet apart, the largest amount of potential distortion would be 0.0075 versus the 0.02 criteria. Actual individual monument settlements and distortions are much smaller.~~

### Additional Settlement Monument Data Discussion

The most recent data set suggests that all survey monuments settled an average of 0.32 feet in 2004. As a comparison, the 2003 data set indicates an average heave of 0.13 feet and the 2002 data set indicates an average settlement of 0.16 feet. Most engineers with geotechnical experience would agree that this settlement pattern is not consistent with general soil or waste consolidation behavior.

It should be noted that there have been disturbances to individual settlement monuments, and several of the survey data sets appear to be affected by frost heave. The effect of these events make the data difficult to interpret but don't invalidate the general observations and conclusions of the overall monitoring program. In order to provide more reliable data in the future, Revision 18 of the LLRW QCA/QC manual provides for redesigned and refurbished settlement monuments to make them less susceptible to disturbance and frost problems in the future.

Even though there are some inconsistencies with the data, some general predictable behaviors can be observed. Attachment 3, Annual Settlement Monument Data Summary, includes a graphical representation of total settlement to date for each monument. The table and graph are organized by grouping the data into east west profiles, with monument numbers 5 and 6 being closest to the north south embankment centerline. For example, monument D5 and D6 are on the west and east sides of the centerline respectively. Monuments D4 and D7 are 100 feet further away from the centerline. Consequently, D5 and D6 are located over a taller waste column than D4 or D7, and even more so than D3 or D8. The actual monument locations are displayed on Figure 1 of the LLRW QCA/QC manual (included as Attachment 4). The data table in Attachment 5 presents additional readings for the 1999 to 2002 period, and is included for completeness.

Examination of the graph on Attachment 3 shows, as expected, that the greatest amount of settlement occurs under the tallest waste column which is near the center of the cell. Settlements decrease significantly for monuments near the edges of the embankment. Due to the data problems described above, the accuracy of the settlement magnitude may be in question, but the distribution is generally as expected.

Another representation of the data is included in the table Cross Section I Settlement Data (Attachment 6). The top part of this table presents all of the available elevation data for the monuments located on the Section I embankment cross section. The mid part of the table presents the incremental differences between the individual, chronological elevation readings. Examination of these incremental readings shows significant variability in the rate and direction of monument movement. Engineers would expect to see a consistent decrease in the rate of settlement, no upward movement of the monuments, and also expect less settlement further away from the embankment centerline. The inconsistencies in this data suggest possible frost heave issues with some data sets, and possible datum issues with other data sets.

The bottom section of the table presents a simplified analysis of potential additional settlement that may occur over the next three years. The presented numbers are based on taking the average individual monument settlement over the last three years and multiplying that result by three years. This is considered as an upper bound estimate. If the data were taken at face value, we would expect to see additional settlement of between 0.2 to 0.6 feet over the next three year period. However, based on typical consolidation behavior, the rates will decrease over time and the actual settlements would be less than shown in this example.

### **Future Settlement Monitoring Plan (Pre-final cover)**

The primary goal of the pre-final cover settlement monitoring plan is to collect a sufficient amount of data to allow for interpretation of the changing rate of settlement and to reliably predict the time frame and magnitude of future settlements. These interpretations and predictions will be used to help establish the schedule for final cover construction. A second goal is to determine the earliest possible time to place the final cover without continuing settlements compromising the original design and long term embankment and cover performance criteria. The most relevant long term performance criterion is limiting differential settlement.

The essential elements of settlement monitoring plans include monument locations, time of installation, surveying frequency, and interpretation and reporting procedures. All of these elements were updated in 2005 for monitoring the completed final cover system, and that plan is fully described in Revision 18 of the CQA/QC plan. Settlement monitoring for areas with temporary cover, referred to as the pre-final cover plan, mirror the final cover plan with the following changes:

1. Pre final cover settlement monuments will be installed as temporary monuments and will be located as close as practical to the final monument locations.
2. The pre final cover temporary monuments will be installed with their base located at the base of the final one foot temporary cover layer. This depth of embedment is expected to secure the temporary monument and protect it from frost heave in all but the most extreme winter seasons.
3. The pre final cover temporary monuments will be installed and surveyed within 30 days of placement of the temporary cover.
4. New monuments will be surveyed again at 2, 4, 8, and 12 months, then semi-annually until the final cover system is placed.
5. Reporting and analysis of settlement data will be compiled annually, and will be provided along with the annual embankment as-built reports.
6. Immediately prior to placement of the final cover, the temporary monuments will be removed.

Attachment 2 provides draft CQA/QC language for a new Work Element – Temporary Cover Placement and Monitoring. This draft is presented as revision 19d, building upon draft revision 19c submitted on July 19, 2005.

The determination of when to build the final cover will be based primarily on when potential future differential settlements will be small enough to not compromise the final cover system. The evaluation of future differential settlements will be based on plotting the individual settlement monument data over time, and using a curve fitting method to extend the curve into the future. The individual monument data sets will be projected a minimum of three years and the projected settlement for each monument will be compared to all adjacent monuments. Once the projected differential settlement between adjacent points results in a distortion of less than 0.01 (half of the design criteria for the embankment), the respective embankment areas will be considered ready for final cover.

It should be noted that embankment areas with temporary cover will be re-graded to the original design grades prior to placement of final cover. This ability to re-grade the top of the embankment after the majority of total and differential settlements are complete will allow the final embankment to remain at or near the design configuration

### **Surcharging Analysis Report & Plan**

Surcharging of embankment materials would be a potential action only if the anticipated decrease in the rates and magnitudes of settlements were not occurring as predicted or as needed to achieve tolerable future differential settlements. To be more specific, broad uniform settlement of the embankments would have little effect on the final cover system, ~~differentiate settlement could be a problem if it was excessive and occurred frequently~~. As described below, excessive differential settlement within the waste material would be the only trigger that would initiate surcharging of the embankments.

#### Conditions That Could Trigger Surcharging

Surcharging of waste materials would only be necessary if one or more of the conditions below are met. It should be noted that it is impractical to be numerically specific about a certain differential settlement rate or time frame that would trigger the need to apply a surcharge. Likewise, the amount of surcharge material to apply would depend on the preferred speed and magnitude for achieving the desired results. It should be noted that the survey monument data to date indicates only small to moderate differential settlements, and it is not anticipated that surcharging would ever be necessary if there was a year or more to allow settlements to occur and to diminish.

1. If observed settlement rates and or magnitudes at some locations were not decreasing at similar rates when compared to the majority of other settlement monument locations.

2. If excessive subsidence were observed between monuments. Excessive subsidence is described as exceeding distortion of 0.01 between two monuments.
3. If the predicted decrease in rate and magnitude of settlement at various points would not allow for placement of the final cover system within the desired time frame for cover construction.

#### Surcharging Approach

1. Define the desired schedule for final cover construction, whether for sub areas or the overall embankment.
2. Using settlement data to date, predict the amount of additional time to achieve future differential settlements of less than a one percent distortion criteria.
3. Evaluate the time available for achieving the necessary additional settlement and define the amount of surcharge material needed to complete the desired settlement within the necessary time frame.

#### Attachments:

1. Komatsu 550 Mobile Crusher and Newell 120104 MegaShredder information
2. Draft revision 19d of the CQA/QC Manual
3. LARW Annual Settlement Monument Data Summary
4. Figure 2 of the CQA/QC Manual
5. LARW Settlement Monument Data 1999 to 2002 Detail
6. Cross Section I Settlement Data

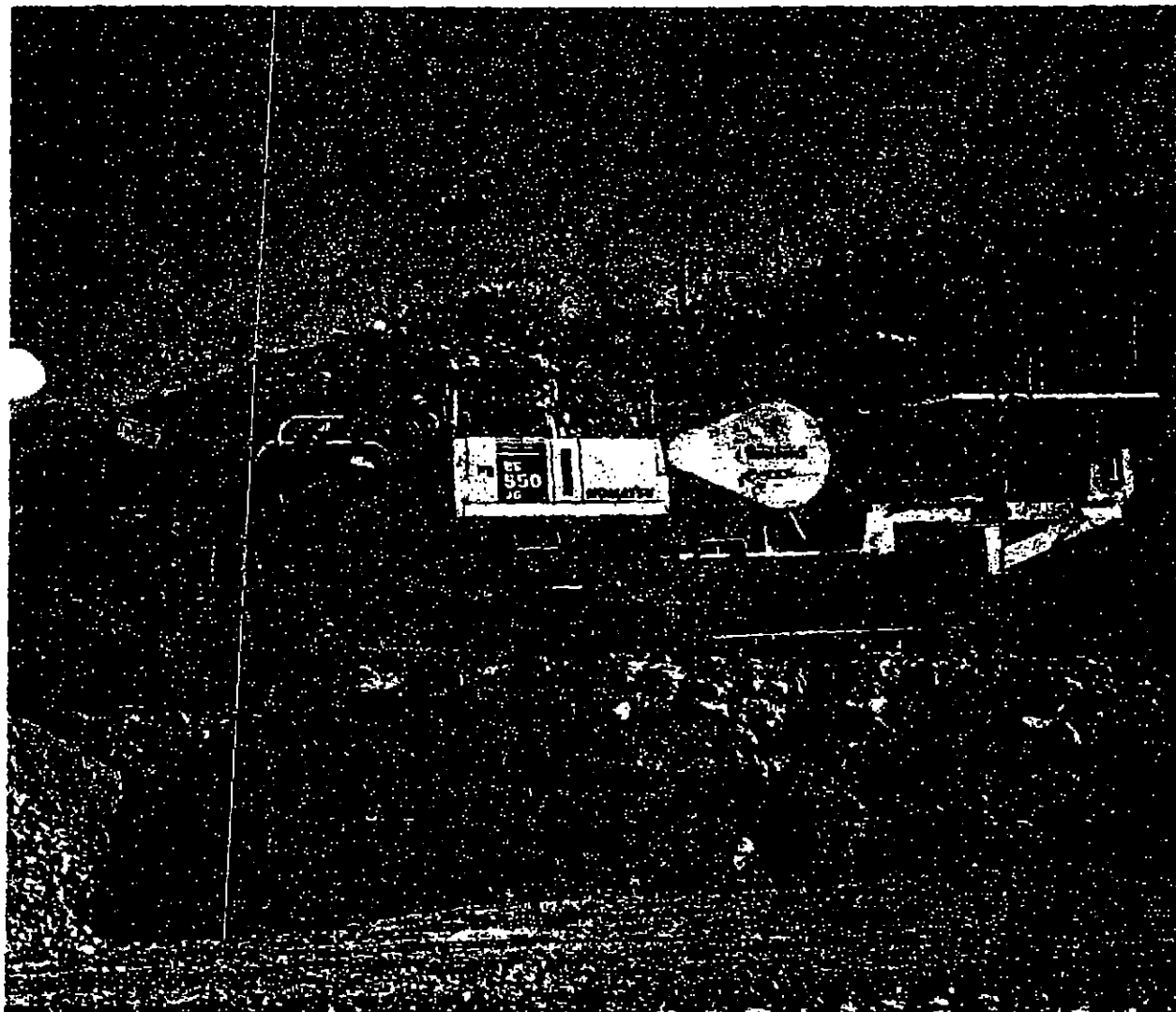
**Attachment 1**

# KOMATSU®

## BR550JG-1

FLYWHEEL HORSEPOWER  
228 kW 306 HP @ 1950 rpm

OPERATING WEIGHT  
47500 kg 104,720 lb



BR  
550  
JG

### MOBILE CRUSHER

# BR550JG-1 Mobile Crusher

Komatsu's newly designed BR550JG-1 enters the market as the most technologically advanced machine available. With excellent crushing power and a production capacity of 100-460 ton/h **110-507 U.S. ton/h**, the Komatsu BR550JG-1 is the optimum choice for your work site.

**Rotating lamp** flashes to indicate travel mode, excessive load on crusher or abnormal condition.

**High performance jaw.** The FS44300A maximum-capacity jaw provides high performance with a simple design that facilitates easy maintenance. Komatsu's unique design allows the discharge setting to be changed with a simple one-touch adjustment in less time than the competition.

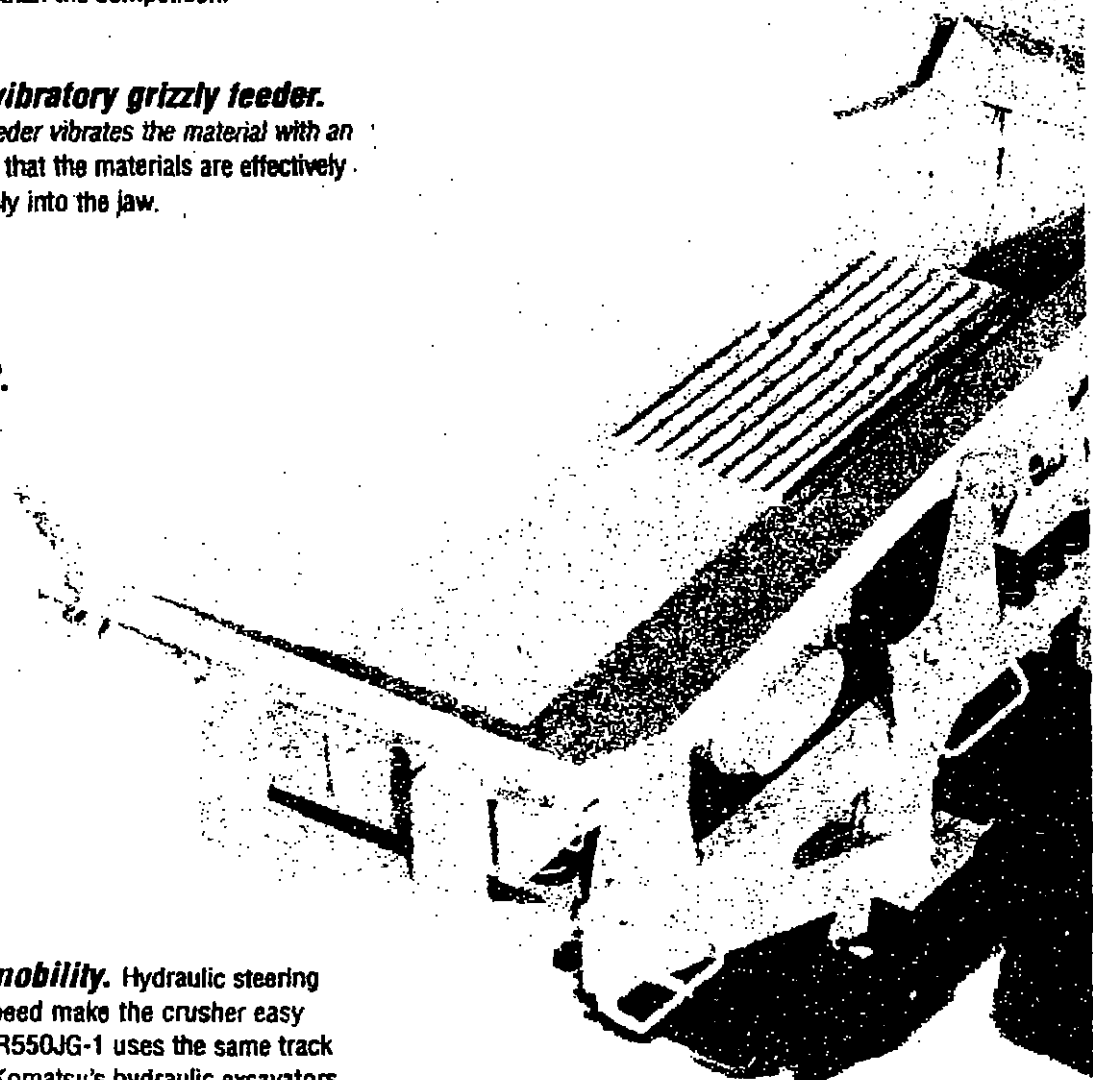
**Newly designed vibratory grizzly feeder.**

The vibratory grizzly feeder vibrates the material with an elliptical movement, so that the materials are effectively separated and fed evenly into the jaw.

**Folding hopper wings for easy loading and transport.**

The hopper is accessible from three sides for material loading. The rear side is especially low—just 3365 mm 11'0" high.

**Outstanding mobility.** Hydraulic steering and high travel speed make the crusher easy to relocate. The BR550JG-1 uses the same track undercarriage as Komatsu's hydraulic excavators.



# BR550JG-1

MOBILE CRUSHER

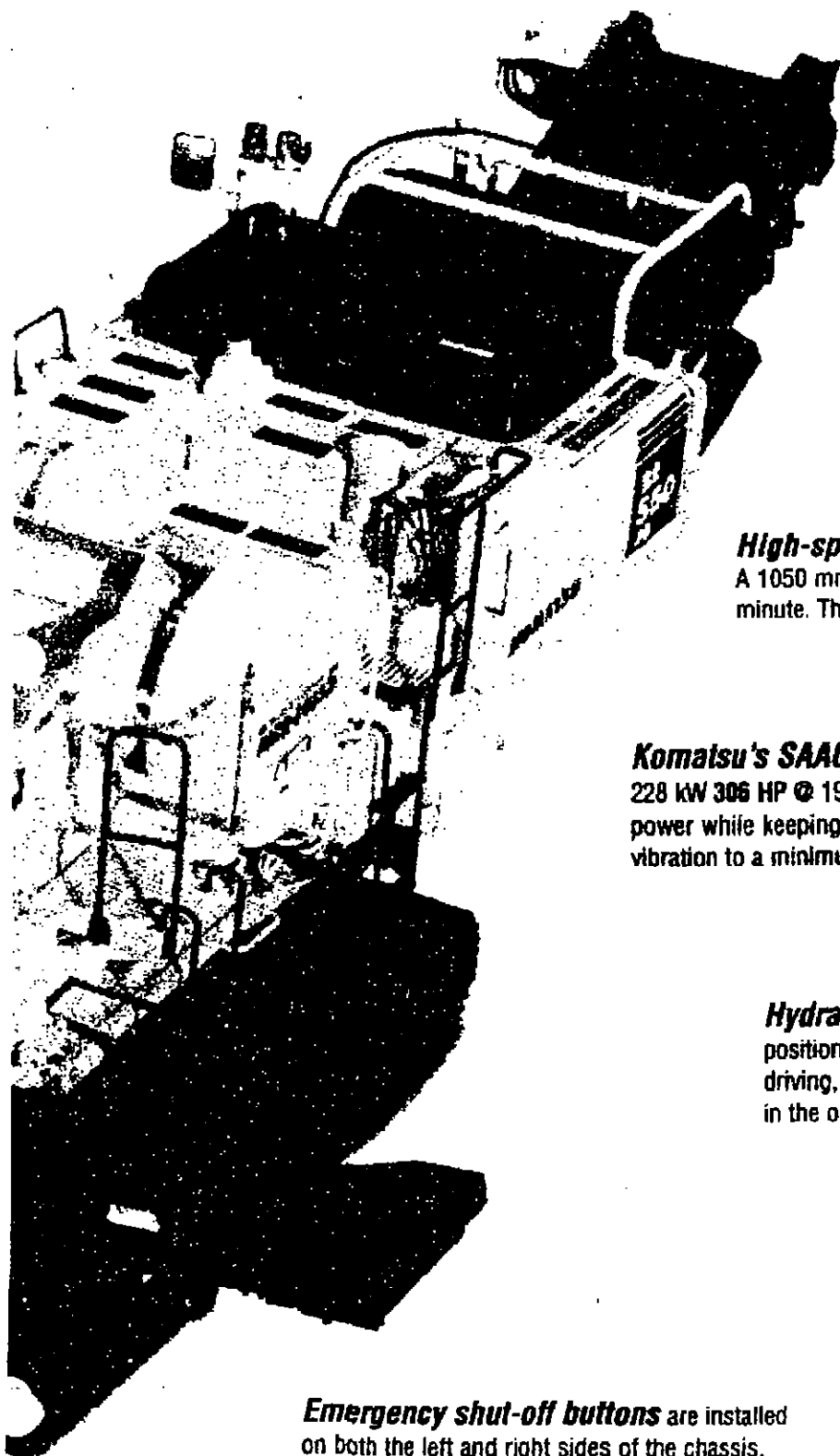
## ***HydrauMind hydraulics and all-hydraulic drive system.***

Fully hydraulic drive system gets you working right away. HydrauMind system supplies the optimal amount of oil through load-sensing and pressure-compensated valves.

**FLYWHEEL HORSEPOWER**  
228 kW 306 HP @ 1950 rpm

**OPERATING WEIGHT**  
47500 kg 104,720 lb

**PRODUCTION CAPACITY**  
100-460 ton/h  
110-507 U.S. ton/h



## ***High-speed, large-capacity conveyor belt.***

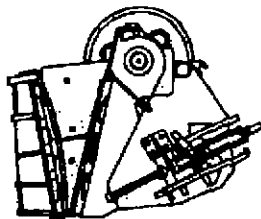
A 1050 mm 42" wide belt moves at 120 m 394' per minute. The discharge height is 3000 mm 9'10".

***Komatsu's SAA6D125E-2 engine*** provides 228 kW 306 HP @ 1950 rpm for maximum crushing power while keeping exhaust gas, noise, and vibration to a minimum.

***Hydraulic conveyor lifter*** at the high position ensures adequate ground clearance when driving, and ample jaw discharge clearance when in the operation mode.

***Sprinkler nozzle*** and a ***connector*** are standard.

***Emergency shut-off buttons*** are installed on both the left and right sides of the chassis, control panel, and radio remote control (optional).



*Designed with the operator in mind, the crusher offers the most up-to-date technological advancement to assist with your crushing needs.*

## Equipped with FS4430QA Jaw Crusher

The powerful FS4430QA jaw crusher with bow-type fixed jaw at high rpm allows you to adjust setting ranges from 55 mm to 200 mm 2.2"-7.9" (OSS) for maximum crushing capabilities, including concrete debris and hard rock. Komatsu's one-touch discharge setting adjustment also allows greater control over your crushing capacity.



FS4430QA Jaw



G.A.P. Adjust Control



Adjuster Switch

- **Maximum crushing efficiency.** The Komatsu semi-automatic feeder system senses the load on the crusher and adjusts the feed rate accordingly to maximize efficiency for all types of rock and concrete debris.
- **Newly designed vibrating grizzly feeder.** By raising the feeder angle to an incline of 4° the muck is more effectively removed and the elliptical movement of the 2-stage grizzly feeder reduces clogging. Also, an optional muck conveyor is available to separate the materials.
- **High-speed, large-capacity conveyor belt.** A 1050 mm 42" wide belt moves quickly to discharge crushed materials. Discharge height is 3 m 9'10", which facilitates stocking and screening the products.



Load-setting Control Lever



Parallel-type Grizzly Bar



### Production Capacity

Maximum production capacity\* (with a muck content of 30%).

Unit: ton/h U.S. ton/h

Material	Crusher Discharge Setting (open side)				
	55 mm 2.2"	70 mm 2.8"	100 mm 3.9"	150 mm 5.9"	200 mm 7.9"
Natural stone	—	—	130-180 143-198	200-280 226-309	280-400 309-441
Concrete debris	100-140 110-154	110-160 121-178	150-220 165-243	230-330 254-384	320-460 353-507

\*The production capacity of the natural stones shown in the table is based on andesite having unconfined compression strength of about 1000 kg/cm<sup>2</sup> 14,225 psi, that of the concrete debris is based on concrete debris containing no steel bars and all the material is assumed to be dry and equal to or smaller than the optimum feed-in material size.

The production capacity is the sum of the quantity of the material crushed by the crusher and the quantity of the material that passed through the grizzly bar. It depends on the type and properties of the material and the working condition.

When the crusher discharge setting is 55-100 mm 2.2"-3.9", only concrete debris can be crushed.

# BR550JG-1 MOBILE CRUSHER

- **High mobility.** The overall height for transportation is reduced below 3.4 m (11'2") by employing hydraulic cylinders to fold the hopper. The BR550JG-1 has high ground clearance. The hydraulic conveyor lifting function ensures ample ground clearance when relocating the machine. The optional radio controller allows remote control travel functions.



Folding Hopper



Lifting Function of Conveyor

**Maximum Reliability and Minimal Maintenance.** Komatsu equipment offers exceptional reliability and the leading edge in technological advancement. The new monitoring system improves maintenance, while standard features such as the pre-cleaner and double cleaner element are installed to improve dust resistance. A large clearance under the crusher means easier maintenance. Even if trouble occurs it can be repaired in a short time.

**Comfortable Design.** In addition to a low-noise engine made with sound-absorbing materials, Komatsu installs low-speed and high-torque hydraulic pumps, a muffler, and other standard parts to reduce noise and vibration. In addition, every crusher is equipped with a standard water sprinkler nozzle to suppress dust and improve the environment.

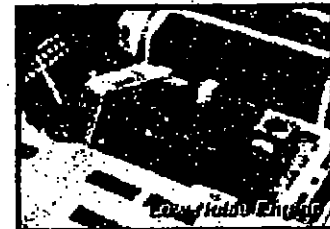
**Easy Operation.** The Mobile Crusher offers high-performance functions. The crusher setting can be completed in 3 minutes with the easy setting adjustment mechanism. The crusher, feeder, discharge conveyor belt, and optional equipment can all be operated at the touch of a button. With the optional remote control, operator control is maximized.

## Safety

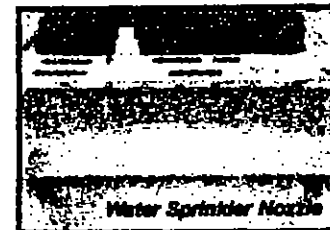
- Emergency shut-off buttons are located on the left and right sides of the chassis, on the control panel, and the remote control (optional).
- A rotating lamp flashes when there is a malfunction on the monitor display (for example, when overheating occurs) and the operator is also alerted by a buzzer in the event of an abnormal shut-down on the conveyor belt or optional equipment.
- A switch is provided to change between crushing and travel modes.
- Handrails and safety guards are provided for all sections.



Openings on Crusher Side



Low-Noise Engine

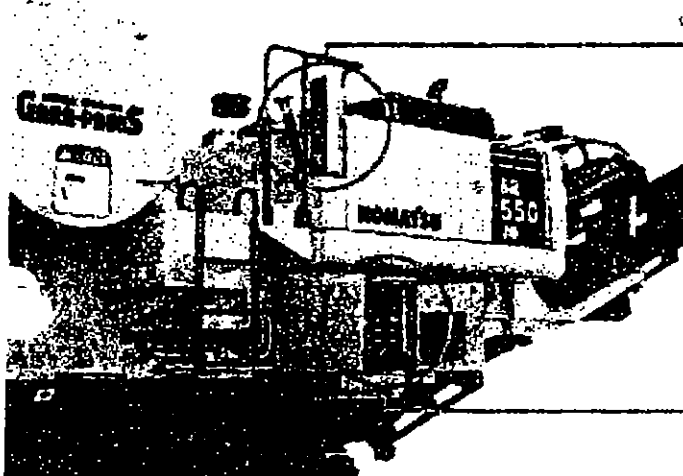


Water Sprinkler Nozzle

Upper Control Panel



Main Control Panel





## ENGINE

Model ..... Komatsu SAA6D125E-2  
 Type ..... 4-cycle, water-cooled, direct injection  
 Aspiration ..... Turbocharged and aftercooled (air to air)  
 Number of cylinders ..... 6  
 Bore ..... 125 mm 4.92"  
 Stroke ..... 150 mm 5.91"  
 Piston displacement ..... 11.04 ltr 574 in<sup>3</sup>  
 Flywheel horsepower ..... 228 kW 308 HP @ 1950 rpm (SAE J1349)  
 Governor ..... All-speed, electrical



## HYDRAULIC SYSTEM

Type ..... Variable capacity with pistons (inclined plate type)  
 Main pump:  
 Type ..... Variable-capacity pistons  
 Pumps for ..... Travel, crusher, conveyor, and options  
 Maximum flow ..... 2 x 310 ltr/min 2 x 82 U.S. gpm  
 Maximum pressure ..... 380 kg/cm<sup>2</sup> 5,405.5 psi  
 Maximum travel speed ..... 3 km/h 1.9 mph

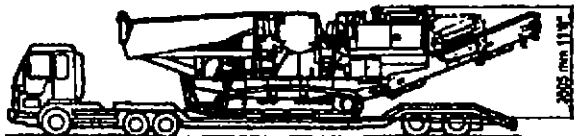
Hydraulic system (travel, crusher, feeder, conveyor, and option):  
 Travel ..... 220 ltr/min 58 U.S. gpm  
 Crusher ..... 325 ltr/min 86 U.S. gpm  
 Feeder ..... 110 ltr/min 29 U.S. gpm  
 Main conveyor ..... 90 ltr/min 24 U.S. gpm  
 Muck conveyor ..... 47 ltr/min 12 U.S. gpm  
 Magnetic separator ..... 38 ltr/min 10 U.S. gpm



## TRANSPORTATION



Condition after rotary lamp assembly, muffler, pre-cleaner, and mirror assembly are removed.



Condition after only rotary lamp and muffler are removed.\*  
 (In some districts, the machine may need to be disassembled for transportation.)

Transport length	13430 mm	44'1"
Transport height	3395 mm	11'2"
Transport height*	3505 mm	11'6"
Transport width	2995 mm	9'10"

\*Condition after only rotary lamp and muffler are removed



## OPERATING WEIGHT

Operating weight, including 600 mm shoes ..... 47500 kg 104,720 lb  
 Production capacity ..... 100-480 ton/h 110-587 U.S. ton/h



## CRUSHER

Jaw ..... Komatsu FS4430QA  
 Inlet size ..... 1120 mm x 766 mm 44" x 30"  
 Discharge setting (O.S.S.) ..... 55 mm to 200 mm 2.2" to 7.9"  
 Rotating speed (variable) ..... 210-300 rpm



## GRIZZLY FEEDER

Frequency ..... Maximum 1000 cpm  
 Size ..... 1125 mm x 4105 mm 44" x 13'6"  
 Drive type ..... Hydraulic gear motor



## UNDERCARRIAGE

Seal of track ..... Sealed track  
 Track adjuster ..... Hydraulic  
 Number of shoes ..... 45 each side  
 Number of carrier rollers ..... 2 sets/one side  
 Number of track rollers ..... 5 sets/one side

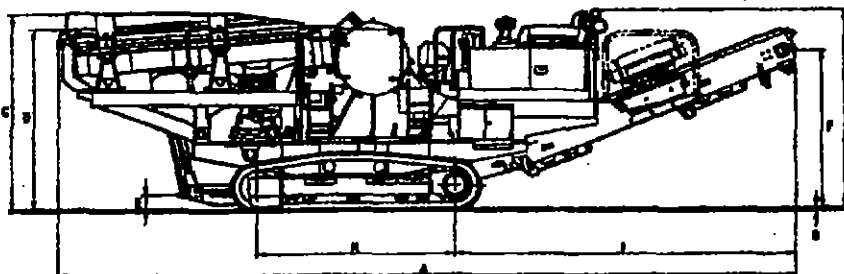
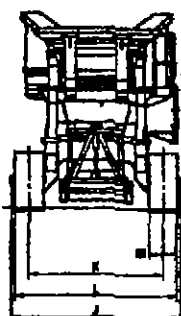


## COOLANT AND LUBRICANT CAPACITY

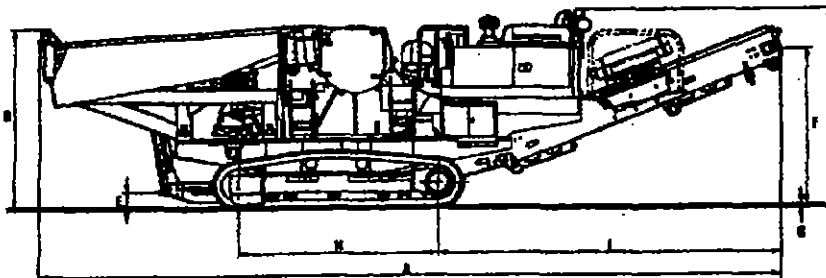
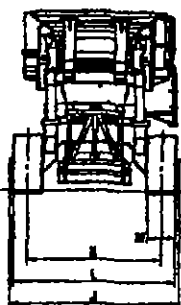
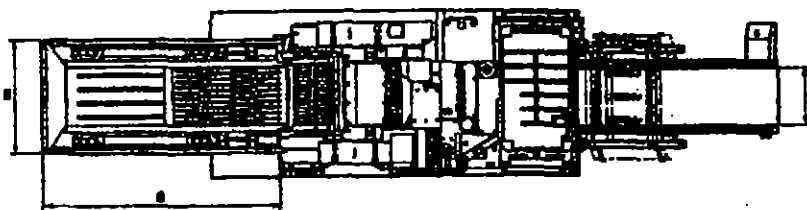
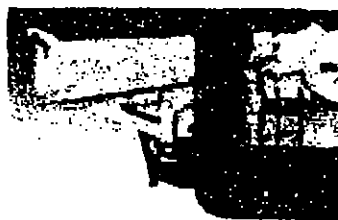
Fuel tank ..... 605 ltr 160 U.S. gal  
 Radiator ..... 43.9 ltr 12 U.S. gal  
 Engine ..... 38 ltr 10 U.S. gal  
 Final drive, each side ..... 9 ltr 2.4 U.S. gal  
 Hydraulic system ..... 370 ltr 98 U.S. gal

## DIMENSIONS

When Operated



When Hopper is Folded



A	Overall length	13430 mm	44'1"
B	Overall height	3640 mm	11'11"
C	Feed height—side	3640 mm	11'11"
D	Feed height—rear	3365 mm	11'0"
E	Minimum ground clearance (during travel)	350 mm	1'2"
F	Discharge height	3000 mm	9'10"
G	Track thickness	30 mm	1"
H	Length of track on ground	3700 mm	12'2"
I	Discharge from idler center	6145 mm	20'2"

J	Overall width	3115 mm	10'3"
K	Track gauge	2480 mm	8'2"
L	Track width	2980 mm	9'9"
M	Shoe width	500 mm	19.7"
N	Hopper width	2805 mm	9'2"
	Hopper width when folded	2130 mm	7'0"
O	Hopper length	4365 mm	14'4"
P	Discharge conveyor belt width	1050 mm	42"



## STANDARD EQUIPMENT

### ENGINE:

- Engine, Komatsu SAA6D125E-2
- 4-cycle, water-cooled, direct injection, turbocharged, and aftercooled (air to air)
- Net horsepower 228 kW 308 HP @ 1950 rpm
- Fuel system:
  - Fuel, light oil, ASTM specification
  - Governor, centrifugal method, all-speed method
- Cooling fan, suction type
- Air cleaner, centrifugal method with paper filter

### ELECTRICAL SYSTEM:

- Starting motor, 11 kW 24 V
- Alternator, 50 ampere 24 V
- Battery, 140 Ah 2 x 12 V

### UNDERCARRIAGE:

- Number of rollers:
  - Upper carrier, two sets/one side
  - Lower track, five sets/one side

### SHOES:

- Assembled triple-grouser type, 500 mm 18.7"
- Tension adjustment, grease cylinder method (cushion springs attached)

### CRUSHER:

- Type, FS4430QA single-toggle crusher
- Size, 1120 mm x 765 mm 44" x 30"
- Rotation, 210-300 rpm
- Drive method, hydraulic motor with V-belt

### FEEDER:

- Type, 2-step deck
- Speed-controlled grizzly feeder
- Dimensions (W x L), 1125 mm x 4105 mm 44" x 13'6"
- Grizzly bar opening, 45-70 mm 1.77"-2.76"
- Drive method, hydraulic gear motor

### BELT CONVEYOR:

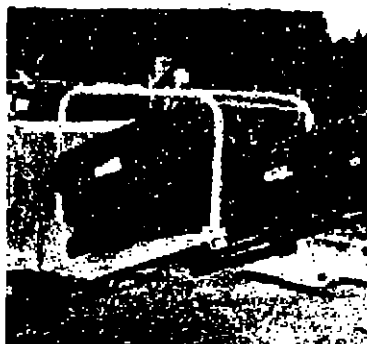
- Width x length, 1050 mm x 10135 mm 42" x 33'3"
- Speed, 120 m/min 394 ft/min
- Drive method, hydraulic piston motor



## OPTIONAL EQUIPMENT

### MAGNETIC SEPARATOR:

- Magnetic separator for primary conveyor, 900 mm 35" wide



Magnetic Separator

### MUCK CONVEYOR:

- Muck conveyor assembly can be folded by hydraulic cylinder, 4000 mm x 600 mm 13'1" x 2'



Muck Conveyor

### RADIO REMOTE CONTROLLER:



#### Function:

- Travel Left/Right/Forward/Reverse
- Crusher On/Off
- Feeder On/Off
- One-Touch Deceleration On/Off
- Emergency Shutoff
- Horn

Radio Remote Controller

AE5570-00

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SN5(3M)C DataKom

5/01 (EV-1)

# KOMATSU

Komatsu America International Company  
440 N. Fairway Dr., Vernon Hills, IL 60061



[www.KomatsuAmerica.com](http://www.KomatsuAmerica.com)

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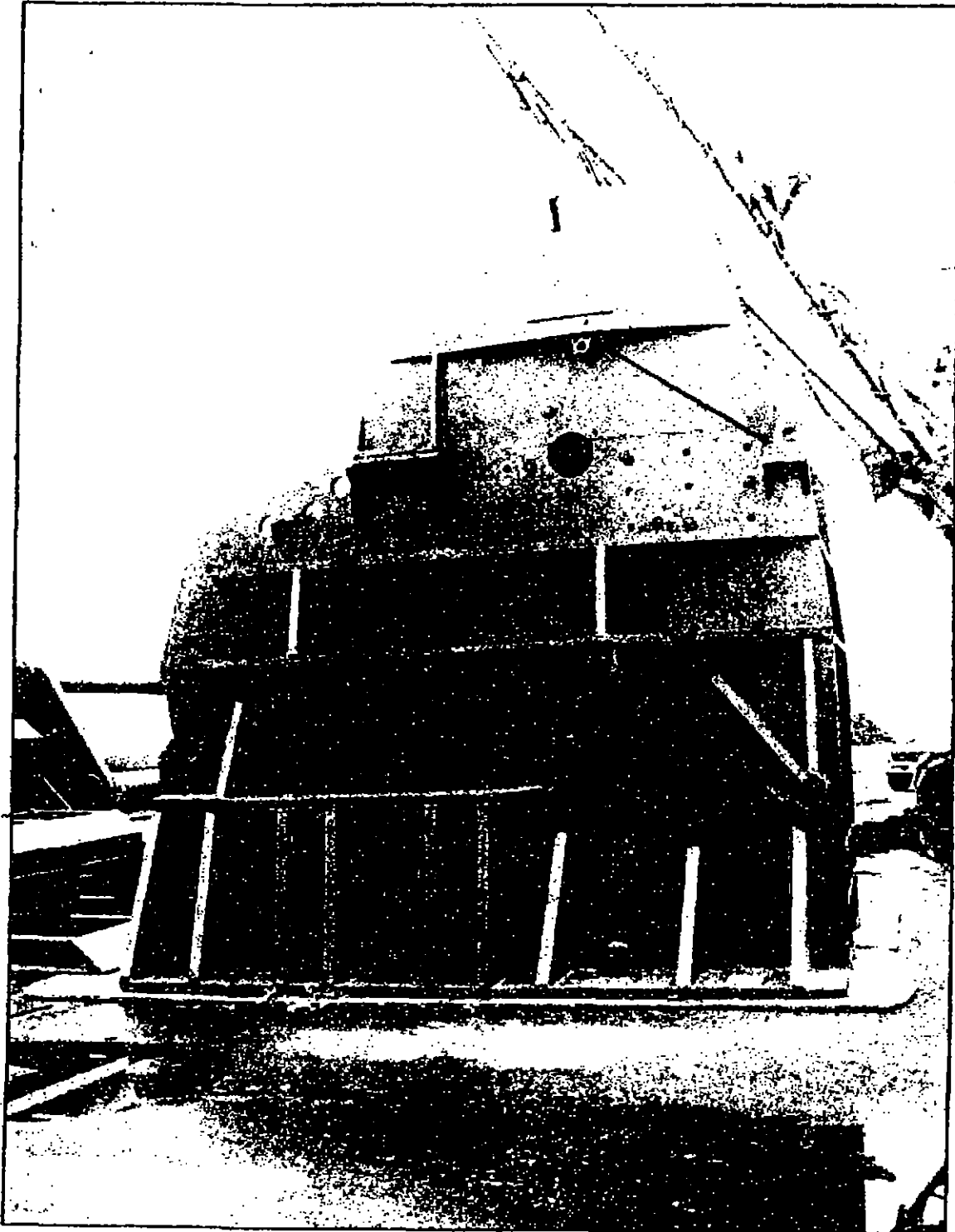
2060 MILITARY ROAD, TONAWANDA, NY 14150-6765 USA

Telephone: 716-873-2211

Fax: 716-873-9309

web site: [www.wendcorp.com](http://www.wendcorp.com)

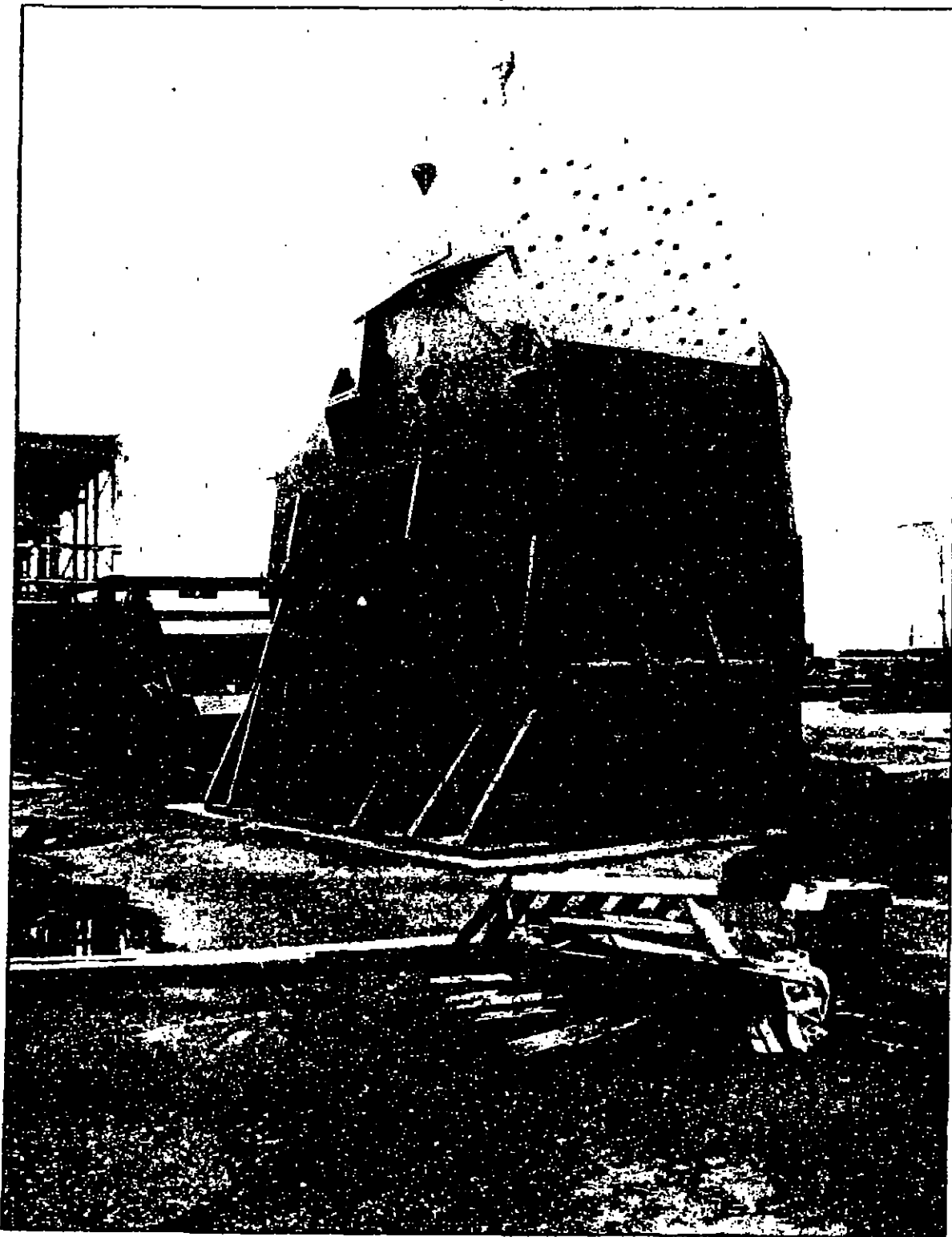
e-mail: [sales@wendcorp.com](mailto:sales@wendcorp.com)





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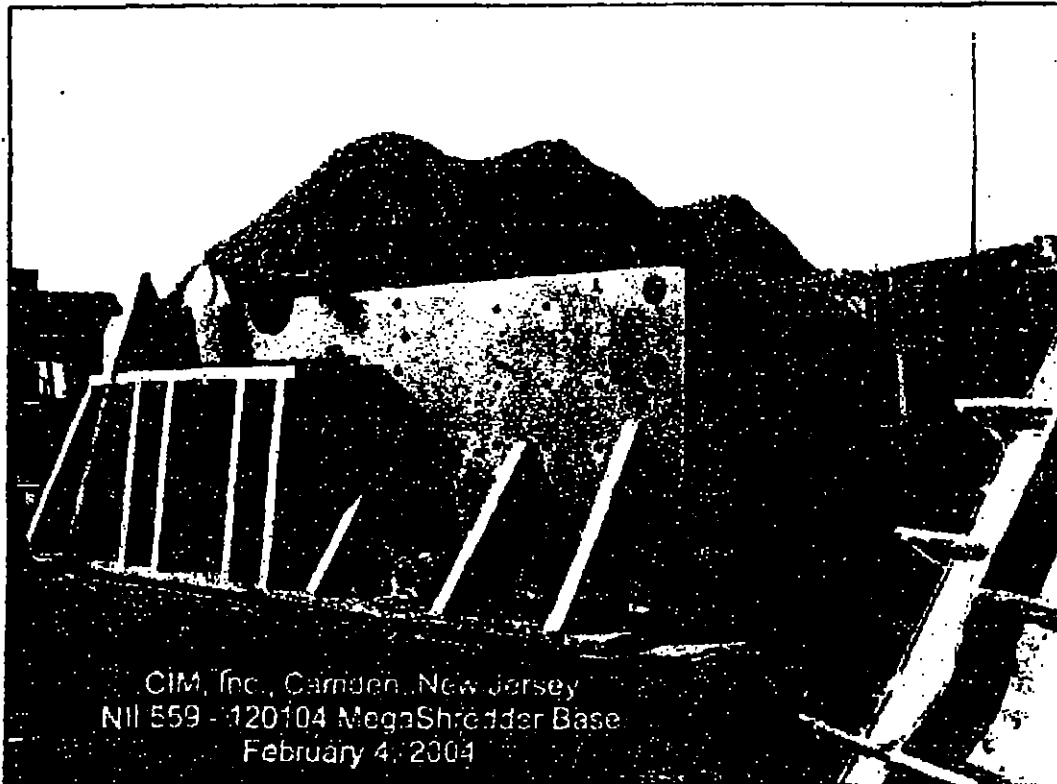
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Telephone: 716-873-2211 Fax: 716-873-9309  
web site: [www.wendcorp.com](http://www.wendcorp.com) email: [sales@wendcorp.com](mailto:sales@wendcorp.com)



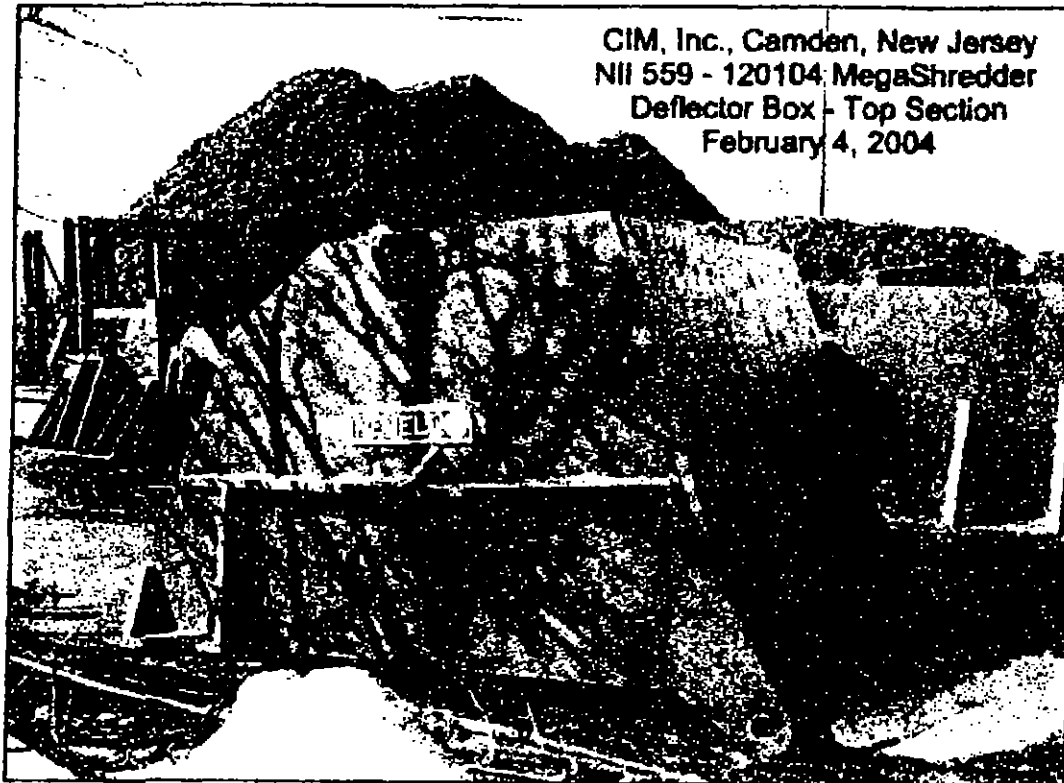


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Telephone: 716-873-2211 Fax: 716-873-9309  
web site [www.wendtcorp.com](http://www.wendtcorp.com) email [sales@wendtcorp.com](mailto:sales@wendtcorp.com)

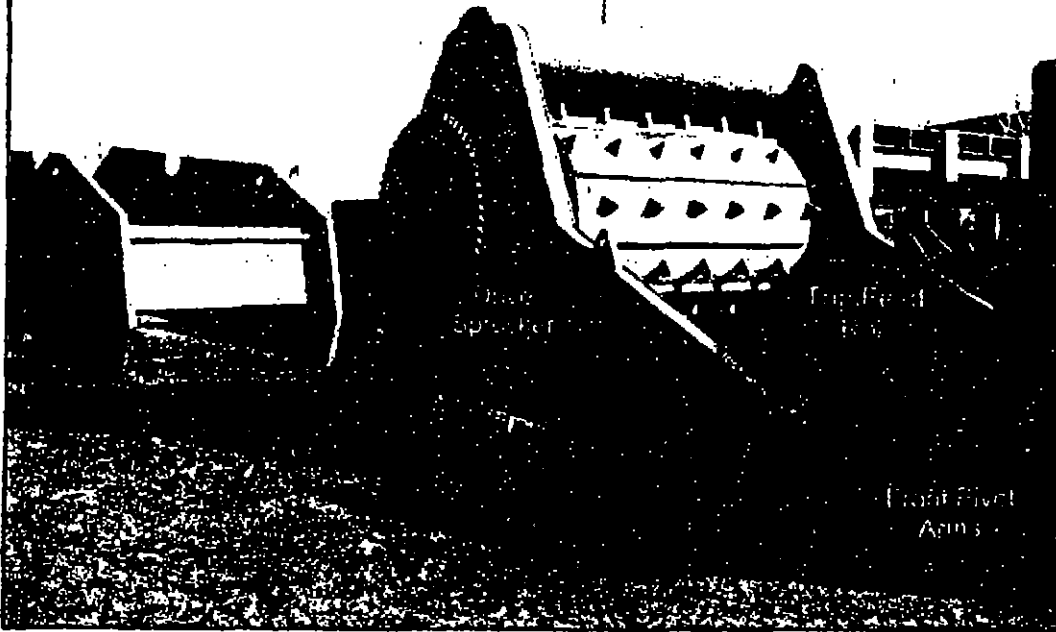


CIM, Inc., Camden, New Jersey  
NII 559 - 120104 MegaShredder Base  
February 4, 2004

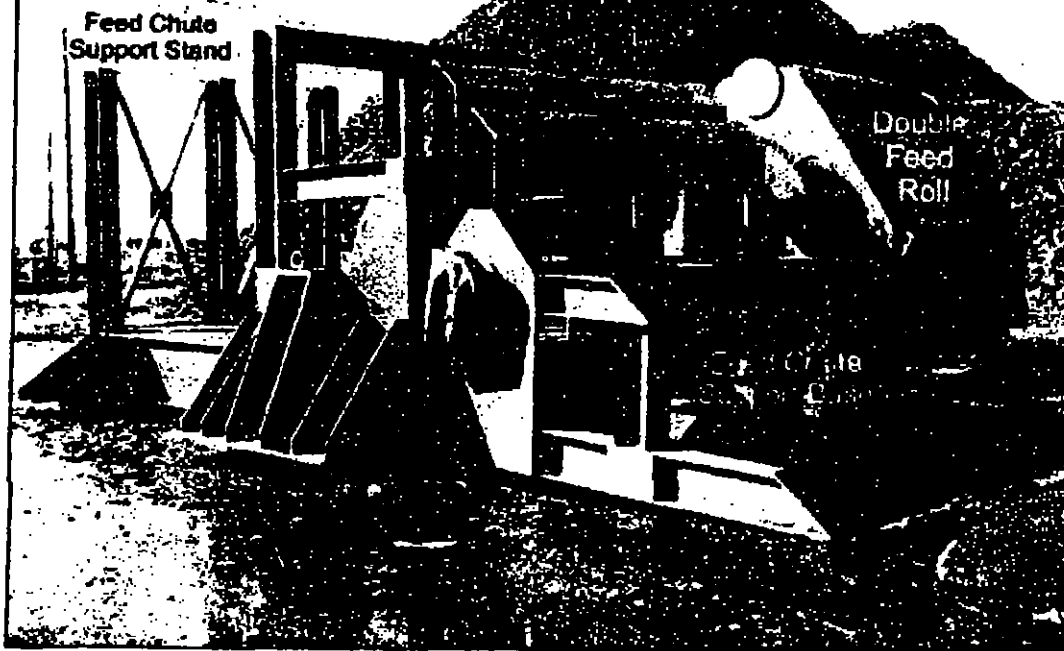


CIM, Inc., Camden, New Jersey  
NII 559 - 120104 MegaShredder  
Deflector Box - Top Section  
February 4, 2004

CIM, Inc., Camden, New Jersey  
 NII 559 - 120104 MegaShredder Double Feed Roll  
 February 4, 2004



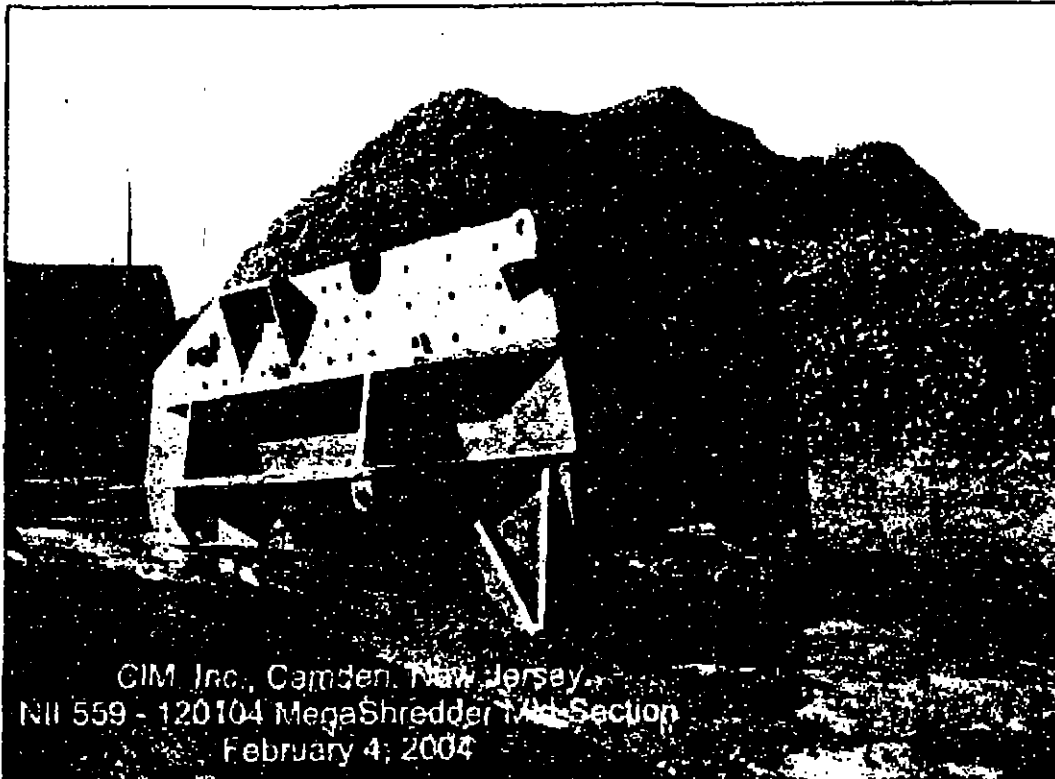
CIM, Inc., Camden, New Jersey  
 NII 559 - 120104 MegaShredder Feed Chute Support  
 February 4, 2004



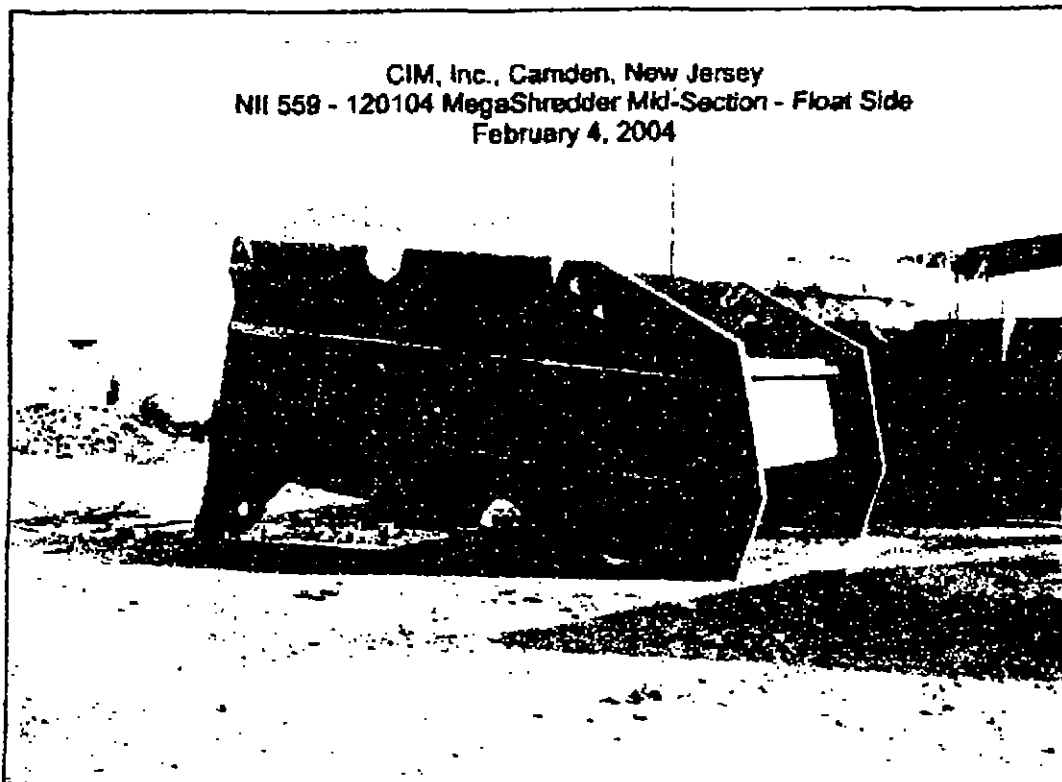


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CIM, Inc., Camden, New Jersey  
NII 559 - 120104 MegaShredder Mid-Section  
February 4, 2004



CIM, Inc., Camden, New Jersey  
NII 559 - 120104 MegaShredder Mid-Section - Float Side  
February 4, 2004



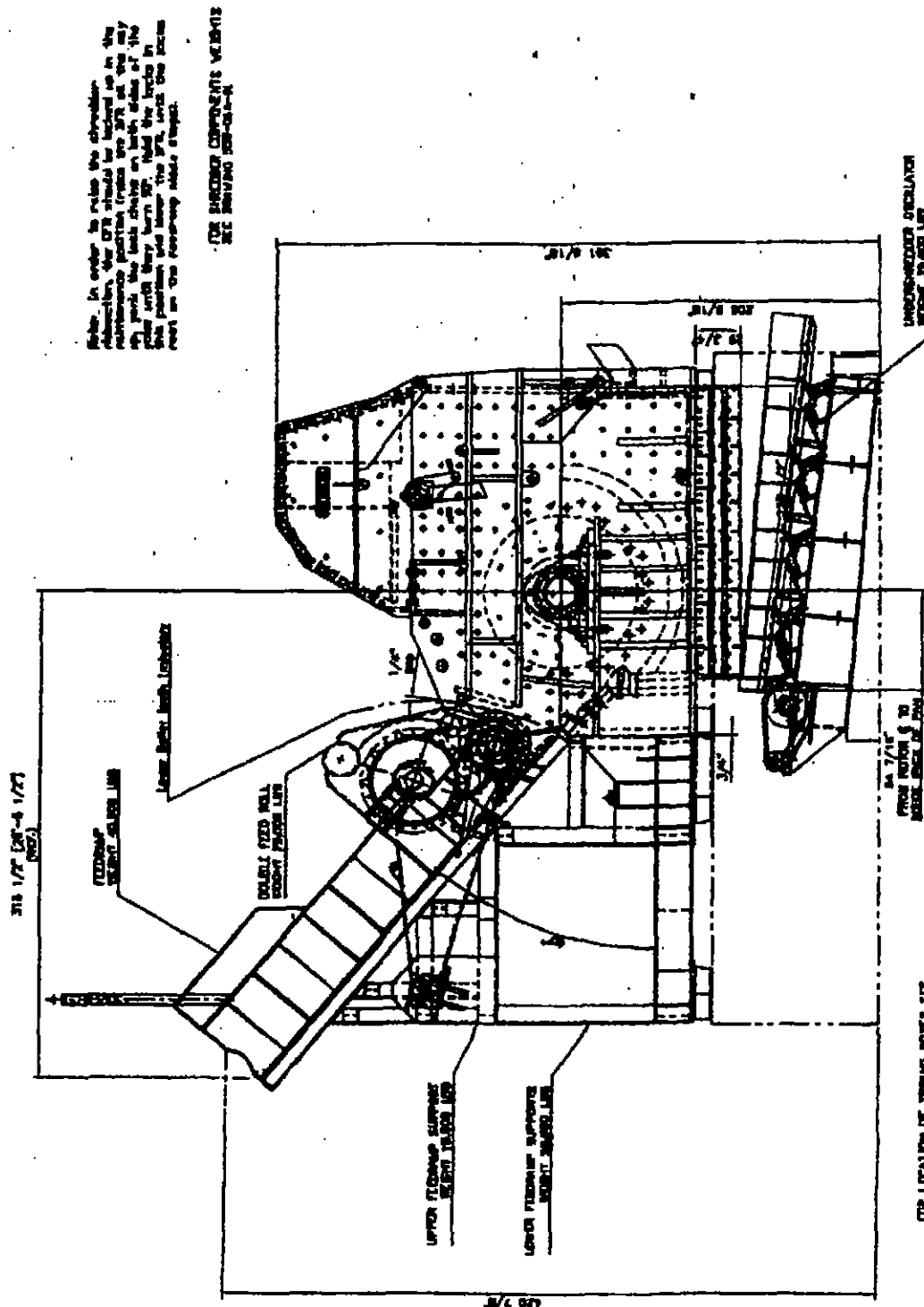
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Telephone: 716-873-2211 Fax: 716-873-9309  
web site: [www.wendtcorp.com](http://www.wendtcorp.com) email: [sales@wendtcorp.com](mailto:sales@wendtcorp.com)

CIM, Inc., Camden, New Jersey  
NII 559 - 120104 MegaShredder Undermill Oscillator  
February 4, 2004

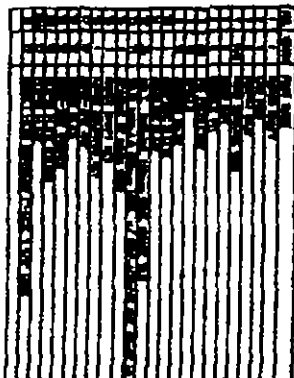


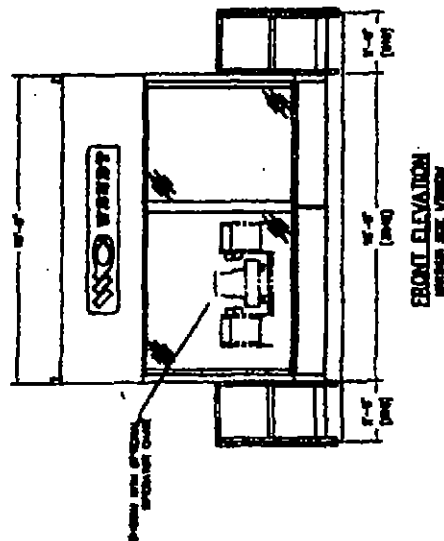






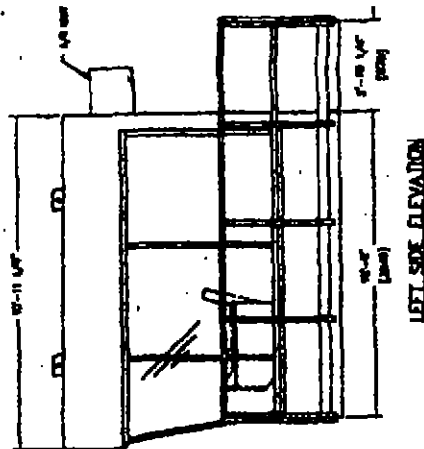


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1. THE BOARD AND THE HORIZONTAL INTERMEDIATE MEMBERS  
- 1/250 TURNING 100 KAL AND UPWARDS -

[illegible]



**Attachment 2**

**ATTACHMENT II-A - CONSTRUCTION PROJECT PLAN FOR LLRW EMBANKMENT**  
**TABLE 1 - QA/QC ACTIVITIES**  
**WORK ELEMENT - TEMPORARY COVER PLACEMENT AND MONITORING**

SPECIFICATION	QUALITY CONTROL	QUALITY ASSURANCE
<u>TEMPORARY COVER MATERIAL:</u> Temporary cover shall be native soils except those that are predominantly sand.	<u>Visually inspect temporary cover soils.</u>	<u>No activity.</u>
<u>TEMPORARY COVER PLACEMENT:</u> Temporary cover shall be placed in lots. Lot size will be a minimum of 50,000 sf. Temporary cover shall be placed within 30 days of reaching the design top of waste elevations and grades for each lot.	<u>Document lift area, location, thickness, and compaction on the Lift Approval Form</u>	<u>Periodically observe lift approval documentation.</u>
Temporary cover shall perform as the Debris Free Zone specified under Work Element - Waste Placement above. Temporary cover shall be placed in accordance with the lift thickness and compaction requirements specified under Work Element - Waste Placement above.		
The edge of the temporary cover shall be marked with fencing and rope, snow fence, or equivalent marking to prevent heavy equipment travel on the temporary cover surface.		
A commercial fixative product or magnesium chloride may be applied to the surface of the temporary cover to aid in dust control and erosion prevention.		
<u>PRE-FINAL COVER SETTLEMENT MONUMENTS:</u> Pre-final cover settlement monuments shall consist of approximately 18-inch long #5 or greater rebar that is welded perpendicular to a metal plate. The metal plate shall be approximately 18 inches square with a thickness of 3/16 inch to 1/4 inch. The metal plate shall be placed on the top of waste surface and then secured by the temporary cover as it is placed. Each monument shall be labeled, flagged, and documented on	<u>Inspect pre-final cover settlement monuments for compliance with the specification prior to installation.</u>	<u>Perform a surveillance of monument installation activities.</u>

**ATTACHMENT II-A - CONSTRUCTION PROJECT PLAN FOR LLRW EMBANKMENT**  
**TABLE 1 - QA/QC ACTIVITIES**  
**WORK ELEMENT - TEMPORARY COVER PLACEMENT AND MONITORING**

SPECIFICATION	QUALITY CONTROL	QUALITY ASSURANCE
a reference drawing.		
<u>PRE-FINAL COVER SETTLEMENT MONUMENT PLACEMENT:</u> Pre-final cover settlement monuments shall be placed as close as practical to the locations of final cover settlement monuments identified in Figure 2.	<u>Perform and document a post-construction survey of the pre-final cover settlement monuments.</u>	<u>Verify that surveys have been performed.</u>
<u>SURVEY REQUIREMENTS:</u> Surveys shall be performed with GPS or approved equivalent equipment. Tolerance shall be no more than $\pm 0.1$ foot.	<u>Calibrate and operate survey equipment in accordance with the manufacturer's recommendations.</u>	
<u>SURVEY INTERVAL:</u> The pre-final cover settlement monuments shall be surveyed within 30 days of temporary cover installation. New monuments shall be surveyed again at 2, 4, 8, and 12 months ( $\pm 10$ calendar days); then semi-annually until final cover construction begins. Weather conditions at the time of the survey and a discussion of the potential for frost to be present shall be documented in the survey report.	<u>Perform and document the required surveys. Provide survey data to the Director of Engineering.</u>	<u>Verify that monument surveys are completed as required.</u>
<u>INSPECTIONS:</u> Monthly inspect temporary cover for the presence of erosion gullies. If the inspection indicates that waste material is exposed due to erosion, the temporary cover shall be repaired in that area within 5 working days.	<u>Perform and document monthly inspections.</u>	
<u>Semi-annually, maintain the temporary cover surface. Maintenance shall consist of filling in any erosion gullies and, if necessary, re-grading to prevent ponding on the temporary cover.</u>	<u>Document semi-annual maintenance activities. Document any areas requiring filling or re-grading.</u>	
<u>REPORTING:</u> Survey data for pre-final cover settlement monuments shall be compiled and analyzed to evaluate total and differential settlement. This data and analysis shall be submitted to DRC with the annual as-		

**ATTACHMENT II-A - CONSTRUCTION PROJECT PLAN FOR LLRW EMBANKMENT**  
**TABLE 1 - QA/QC ACTIVITIES**  
**WORK ELEMENT - TEMPORARY COVER PLACEMENT AND MONITORING**

SPECIFICATION	QUALITY CONTROL	QUALITY ASSURANCE
built report.		
<u>TRANSITION TO FINAL COVER:</u> Immediately prior to placement of the first lift of radon barrier, the pre-final cover settlement monuments shall be removed and the temporary cover surface restored.	Inspect and document that all pre-final cover settlement monuments have been removed prior to final cover construction.	<u>Verify that pre-final cover settlement monuments have been removed and that the temporary cover surface meets design top of waste grades and elevations.</u>
Additional clean debris-free soil material shall be placed as needed to return the area for final cover construction to the original top of waste design grades and elevations.	Survey and document the temporary cover surface to confirm that the top of waste design grades and elevations are achieved.	

**Attachment 3**

**Attachment 6**



# ATTACHMENT 3



AWB12/B13  
Top of Waste Survey  
12-6-02 (Page 2 of 42)

1044 N 12,429.59 E 11,604.26 Design 4,298.60 Actual 4,298.54	1043 N 12,428.57 E 11,654.25 Design 4,298.60 Actual 4,298.52	1042 N 12,427.54 E 11,704.24 Design 4,298.60 Actual 4,298.41	1041 N 12,426.52 E 11,754.23 Design 4,298.60 Actual 4,298.49	132 N 12,425.50 E 11,804.22 Design 4,298.60 Actual 4,298.42		
1016 N 12,391.63 E 11,503.61 Design 4,297.00 Actual 4,296.80	1031 N 12,390.61 E 11,553.60 Design 4,297.00 Actual 4,296.76	1032 N 12,389.59 E 11,603.59 Design 4,297.00 Actual 4,297.00	1012 N 12,388.57 E 11,653.58 Design 4,297.00 Actual 4,296.84	1038 N 12,387.55 E 11,703.57 Design 4,297.00 Actual 4,296.89	1040 N 12,386.53 E 11,753.56 Design 4,297.00 Actual 4,296.87	129 N 12,385.51 E 11,803.55 Design 4,297.00 Actual 4,296.61
1015 N 12,381.64 E 11,503.44 Design 4,295.00 Actual 4,294.73	1029 N 12,380.62 E 11,553.43 Design 4,295.00 Actual 4,294.76	1030 N 12,379.59 E 11,603.42 Design 4,295.00 Actual 4,294.89	1011 N 12,378.57 E 11,653.41 Design 4,295.00 Actual 4,294.74	1037 N 12,377.55 E 11,703.40 Design 4,295.00 Actual 4,294.69	1039 N 12,376.53 E 11,753.39 Design 4,295.00 Actual 4,294.91	120 N 12,375.51 E 11,803.38 Design 4,295.00 Actual 4,293.84
1014 N 12,331.64 E 11,502.60 Design 4,285.00 Actual 4,284.83	1027 N 12,330.62 E 11,552.59 Design 4,285.00 Actual 4,284.96	1028 N 12,329.60 E 11,602.58 Design 4,285.00 Actual 4,284.86	1010 N 12,328.58 E 11,652.57 Design 4,285.00 Actual 4,284.81	117 N 12,327.56 E 11,702.56 Design 4,285.00 Actual 4,284.80	116 N 12,326.54 E 11,752.55 Design 4,285.00 Actual 4,284.78	115 N 12,325.52 E 11,802.54 Design 4,285.00 Actual 4,284.81
310 N 12,281.65 E 11,501.77 Design 4,275.00 Actual 4,274.87	309 N 12,280.63 E 11,551.76 Design 4,275.00 Actual 4,274.93	308 N 12,279.61 E 11,601.75 Design 4,275.00 Actual 4,274.91	1009 N 12,278.59 E 11,651.74 Design 4,275.00 Actual 4,274.73	104 N 12,277.56 E 11,701.73 Design 4,275.00 Actual 4,274.71	105 N 12,276.54 E 11,751.72 Design 4,275.00 Actual 4,274.81	106 N 12,275.52 E 11,801.71 Design 4,275.00 Actual 4,274.85
1003 N 12,231.66 E 11,500.93 Design 4,265.70 Actual 4,265.61	1004 N 12,230.63 E 11,550.92 Design 4,265.77 Actual 4,265.45	1005 N 12,229.61 E 11,600.91 Design 4,265.87 Actual 4,265.42	1006 N 12,228.59 E 11,650.90 Design 4,265.85 Actual 4,265.33	1007 N 12,227.57 E 11,700.89 Design 4,265.81 Actual 4,265.54	1008 N 12,226.55 E 11,750.88 Design 4,265.66 Actual 4,265.28	101 N 12,225.53 E 11,800.87 Design 4,265.55 Actual 4,265.44

**ENVIROCARE**  
OF UTAH, INC.  
THE SAFE ALTERNATIVE

**Class A**  
**Top Of Waste (native soil)**  
 AWC16 & AWC18

Point Number	Northing	Easting	Design Elevation	Actual Elevation	Fill
300	12670.38	12058.35	4308.60	4308.30	0.30
301	12669.34	12108.34	4308.60	4307.86	0.74
302	12668.32	12158.33	4308.60	4307.88	0.72
303	12618.33	12157.49	4306.60	4306.28	0.32
304	12568.33	12156.65	4304.60	4304.51	0.09
306	12540.00	12106.17	4303.42	4303.24	0.18
307	12569.36	12106.66	4304.60	4304.45	0.15
308	12619.35	12107.50	4306.60	4306.53	0.08
309	12620.37	12057.51	4306.60	4306.54	0.06
310	12570.38	12056.67	4304.60	4304.51	0.09
311	12540.00	12056.18	4303.38	4303.24	0.14
99	12665.26	12308.29	4302.60	4302.40	0.20
100	12666.28	12258.30	4304.60	4304.50	0.10
101	12667.30	12208.31	4306.60	4306.04	0.57
102	12567.31	12206.64	4304.60	4304.49	0.11
103	12617.31	12207.48	4306.60	4306.12	0.48
104	12616.29	12267.47	4304.60	4304.05	0.55
105	12566.29	12256.63	4304.60	4304.21	0.39
106	12565.27	12306.62	4302.60	4302.25	0.35
107	12615.26	12307.46	4302.60	4302.14	0.46
S.5	12540.00	12256.19	4303.55	4303.46	0.09
S.6	12540.00	12206.19	4303.55	4303.07	0.48
S.7	12540.00	12156.18	4303.47	4303.25	0.22
S.8	12540.00	12306.20	4301.59	4301.48	0.11

0.44

**Backsight Reshoot**  
 GW-69

	Northing	Easting	Elevation
Reshoot	13303.82	12701.86	4276.83
Actual	13303.81	12701.86	4276.82
Difference	0.01	0.00	0.01

Specification: At or below design grade

Surveyed By: [Signature]

Date: 1/18/02

Q.C. Officer Approval

[Signature]

Date

Q.A. Approval

[Signature]

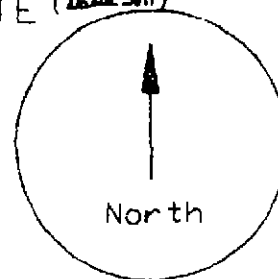
Date

1-18-02

COPY

# CLASS A TOP OF WASTE (Under Soil) AWC16 & AWC18

KEY  
Point Number  
Design Elevation  
Actual Elevation  
Amount of Fill to Design Elev.



Pt# 300  
4,308.60  
4,308.30  
0.30

Pt# 301  
4,308.60  
4,307.86  
0.74

Pt# 302  
4,308.60  
4,307.88  
0.72

Pt# 101  
4,306.60  
4,306.03  
0.56

Pt# 100  
4,304.60  
4,304.50  
0.10

Pt# 99  
4,302.60  
4,302.40  
0.20

Pt# 309  
4,306.60  
4,306.54  
0.06

Pt# 308  
4,306.60  
4,306.52  
0.07

Pt# 303  
4,306.60  
4,306.28  
0.32

Pt# 103  
4,306.60  
4,306.12  
0.48

Pt# 104  
4,304.60  
4,304.05  
0.55

Pt# 107  
4,302.60  
4,302.14  
0.46

Pt# 310  
4,304.60  
4,304.51  
0.09

Pt# 307  
4,304.60  
4,304.45  
0.15

Pt# 304  
4,304.60  
4,304.51  
0.09

Pt# 102  
4,304.60  
4,304.49  
0.11

Pt# 105  
4,304.60  
4,304.21  
0.39

Pt# 106  
4,302.60  
4,302.25  
0.35

Pt# 311  
4,303.38  
4,303.24  
0.14

Pt# 306  
4,303.42  
4,303.24  
0.18

Pt# S7  
4,303.47  
4,303.25  
0.22

Pt# S6 <sup>refill</sup>  
4,303.75 <sup>7501.51</sup>  
4,303.07  
0.68 <sup>0.44</sup>  
Asphalt

Pt# S5  
4,303.55  
4,303.46  
0.09

Pt# S8  
4,301.59  
4,301.48  
0.11

COPY

# Top Of Debris Survey (AWC16/AWC18)

Date: 12-21-01 Surveyed By: Gordon Jensen Verified By: Reed Bongert

12/21/01

N 12,670.36	N 12,669.34	N 12,668.32	N 12,667.30	N 12,666.28	N 12,665.26
E 12,058.35	E 12,108.34	E 12,158.33	E 12,208.31	E 12,258.30	E 12,308.29
D 4,308.60	D 4,308.60	D 4,308.60	D 4,308.60	D 4,308.60	D 4,308.60
A 4,308.80	A 4,308.75	A 4,307.81	A 4,306.37	A 4,304.41	A 4,302.33
F -0.20	F -0.15	F 0.79	F 0.23	F 0.19	F 0.27

N 12,620.37	N 12,619.35	N 12,618.33	N 12,617.31	N 12,616.29	N 12,615.26
E 12,057.51	E 12,107.50	E 12,157.49	E 12,207.48	E 12,257.47	E 12,307.46
D 4,306.60	D 4,306.60	D 4,306.60	D 4,306.60	D 4,304.60	D 4,302.60
A 4,305.47	A 4,305.49	A 4,305.47	A 4,305.41	A 4,303.45	A 4,302.43
F 1.13	F 1.11	F 1.15	F 1.19	F 1.15	F 0.17

N 12,570.38	N 12,569.36	N 12,568.33	N 12,567.31	N 12,566.29	N 12,565.27
E 12,056.67	E 12,106.66	E 12,156.65	E 12,206.64	E 12,256.63	E 12,306.62
D 4,304.60	D 4,304.60	D 4,304.60	D 4,304.60	D 4,304.60	D 4,302.60
A 4,303.55	A 4,303.54	A 4,303.36	A 4,303.46	A 4,303.40	A 4,302.39
F 1.05	F 1.06	F 1.24	F 1.14	F 1.20	F -0.31

N 12,540.00	N 12,540.00	N 12,540.00	N 12,540.00	N 12,540.00	N 12,540.00
E 12,056.16	E 12,106.17	E 12,156.18	E 12,206.19	E 12,256.19	E 12,306.20
D 4,303.38	D 4,303.42	D 4,303.47	D 4,302.45	D 4,303.55	D 4,301.59
A 4,302.31	A 4,302.10	A 4,302.37	A 4,302.06	A 4,302.46	A 4,302.05
F 1.07	F 1.32	F 1.10	F 1.09	F 1.09	F -0.46

## KEY

N = Northing  
E = Easting  
D = Design Elev.  
A = Actual Elev.  
F = Fill to Design Elev.

\*\*\* Tie-in PT's

1' of Debris Free already placed  
See AWH17-H18-H20-C20  
Top of Waste Survey

## Page 1 of 4

**NORTH**



**ENVIROCARE**  
OF UTAH, INC.  
THE SAFE ALTERNATIVE



UTAH DEPARTMENT OF TRANSPORTATION  
THE SAFE ALTERNATIVE

ORIGINAL

## Class A Top of Waste Survey

AWA15/AWB15 (Top Slope & Side Slope)

### Points List

Page 2 of 4

Pt #	Northing	Easting	Design Elevation	Actual Elevation	Fill to Design
1	12,520.38	12,055.84	4,302.60	4,301.62	0.98
2	12,519.36	12,105.83	4,302.60	4,302.41	0.19
3	12,518.34	12,155.82	4,302.60	4,302.49	0.11
4	12,517.32	12,205.81	4,302.60	4,302.39	0.21
5	12,516.30	12,255.80	4,302.60	4,302.45	0.15
6	12,515.28	12,305.79	4,302.60	4,302.29	0.31
7	12,514.26	12,355.78	4,300.60	4,300.51	0.10
8	12,513.23	12,405.77	4,298.60	4,298.44	0.16
9	12,512.42	12,445.76	4,297.00	4,296.82	0.08
10	12,512.21	12,455.76	4,295.00	4,294.82	0.19
11	12,511.19	12,505.75	4,285.00	4,284.89	0.11
12	12,510.17	12,555.74	4,275.00	4,274.92	0.08
13	12,509.15	12,605.73	4,265.50	4,265.29	0.21
14	12,459.16	12,604.89	4,265.61	4,265.33	0.28
15	12,460.18	12,554.90	4,275.00	4,274.84	0.16
16	12,461.20	12,504.91	4,285.00	4,284.91	0.09
17	12,462.22	12,454.92	4,295.00	4,294.87	0.13
18	12,462.42	12,444.92	4,297.00	4,296.91	0.09
19	12,463.24	12,404.93	4,298.60	4,298.56	0.04
20	12,464.26	12,354.94	4,300.60	4,300.45	0.15
21	12,465.28	12,304.95	4,300.60	4,300.45	0.15
22	12,466.31	12,254.96	4,300.60	4,300.46	0.14
23	12,467.33	12,204.97	4,300.60	4,300.56	0.04
24	12,468.35	12,154.98	4,300.60	4,300.51	0.09
25	12,469.37	12,105.00	4,300.60	4,300.45	0.15
26	12,470.39	12,055.00	4,300.60	4,300.47	0.13
27	12,420.40	12,054.17	4,298.60	4,298.42	0.18
28	12,419.38	12,104.16	4,298.60	4,298.48	0.12
29	12,418.35	12,154.14	4,298.60	4,298.52	0.08
30	12,417.33	12,204.13	4,298.60	4,298.50	0.10
31	12,416.31	12,254.12	4,298.60	4,298.55	0.06
32	12,415.29	12,304.11	4,298.60	4,298.47	0.14
33	12,414.27	12,354.10	4,298.60	4,297.26	1.34
34	12,413.25	12,404.09	4,298.60	4,298.53	0.07
35	12,412.43	12,444.09	4,297.00	4,296.61	0.39
36	12,412.23	12,454.08	4,295.00	4,294.93	0.07
37	12,411.21	12,504.07	4,285.00	4,284.83	0.17
38	12,410.18	12,554.06	4,275.00	4,274.96	0.04
39	12,409.16	12,604.05	4,265.41	4,265.33	0.08
40	12,359.17	12,603.22	4,265.12	4,265.41	0.71
41	12,360.19	12,553.23	4,275.00	4,274.88	0.12
42	12,361.21	12,503.24	4,285.00	4,284.89	0.11
43	12,362.23	12,453.25	4,295.00	4,294.83	0.17
44	12,363.25	12,403.26	4,295.00	4,294.82	0.18

Surveyed By:

Travis Jensen & Travis Sutherland

Date:

10/8/2002

Specification:

At or Below Design

ORIGINAL

Pt #	Northing	Easting	Design	Actual	Fill
45	12,364.28	12,353.27	4,295.00	4,294.92	0.08
46	12,365.30	12,303.28	4,295.00	4,294.91	0.09
47	12,366.32	12,253.29	4,295.00	4,294.85	0.15
48	12,367.34	12,203.30	4,295.00	4,294.93	0.07
49	12,368.36	12,153.31	4,295.00	4,294.90	0.10
50	12,369.38	12,103.32	4,295.00	4,294.84	0.16
51	12,370.40	12,053.33	4,295.00	4,294.73	0.27
52	12,380.40	12,053.50	4,297.00	4,296.79	0.22
53	12,379.38	12,103.49	4,297.00	4,296.82	0.19
54	12,378.36	12,153.48	4,297.00	4,296.81	0.19
55	12,377.34	12,203.47	4,297.00	4,296.84	0.16
56	12,376.32	12,253.46	4,297.00	4,296.89	0.11
57	12,375.30	12,303.45	4,297.00	4,296.86	0.14
58	12,374.27	12,353.44	4,297.00	4,296.86	0.14
59	12,373.25	12,403.43	4,297.00	4,296.83	0.17
60	12,372.44	12,443.42	4,297.00	4,296.81	0.19
61	12,309.00	12,602.38	4,266.17	4,266.09	0.09
62	12,310.20	12,552.40	4,275.00	4,274.70	0.30
63	12,311.22	12,502.40	4,285.00	4,284.70	0.30
64	12,312.24	12,452.41	4,285.00	4,284.72	0.28
65	12,313.26	12,402.42	4,285.00	4,284.84	0.16
66	12,314.28	12,352.43	4,285.00	4,284.80	0.20
67	12,315.30	12,302.44	4,285.00	4,284.79	0.21
68	12,316.33	12,252.45	4,285.00	4,284.74	0.26
69	12,317.35	12,202.46	4,285.00	4,284.82	0.18
70	12,318.37	12,152.47	4,285.00	4,284.83	0.17
71	12,319.39	12,102.48	4,285.00	4,284.72	0.28
72	12,320.41	12,052.49	4,285.00	4,284.74	0.26
73	12,270.41	12,051.66	4,275.00	4,274.79	0.21
74	12,269.40	12,101.65	4,275.00	4,274.81	0.19
75	12,268.37	12,151.64	4,275.00	4,274.78	0.22
76	12,267.35	12,201.63	4,275.00	4,274.78	0.23
77	12,266.33	12,251.62	4,275.00	4,274.72	0.28
78	12,265.31	12,301.61	4,275.00	4,274.76	0.24
79	12,264.29	12,351.60	4,275.00	4,274.76	0.24
80	12,263.27	12,401.59	4,275.00	4,274.79	0.21
81	12,262.25	12,451.58	4,275.00	4,274.76	0.24
82	12,261.23	12,501.57	4,275.00	4,274.76	0.24
83	12,260.20	12,551.56	4,275.00	4,274.75	0.25
84	12,259.18	12,601.55	4,266.00	4,265.93	0.07
85	12,209.19	12,600.71	4,266.30	4,265.96	0.34
86	12,210.21	12,550.72	4,266.00	4,265.95	0.05
87	12,211.23	12,500.73	4,266.00	4,265.85	0.15
88	12,212.25	12,450.74	4,265.97	4,265.83	0.34
89	12,213.27	12,400.75	4,265.97	4,265.71	0.28
90	12,214.30	12,350.76	4,265.94	4,265.87	0.07
91	12,215.32	12,300.77	4,266.13	4,265.93	0.20
92	12,216.34	12,250.78	4,266.16	4,265.88	0.28
93	12,217.36	12,200.79	4,266.08	4,266.02	0.06
94	12,218.38	12,150.80	4,266.12	4,265.97	0.15
95	12,219.40	12,100.81	4,266.05	4,265.87	0.18
96	12,220.42	12,050.82	4,265.43	4,265.38	0.05

ORIGINAL

Pt #	Northing	Easting	Design	Actual	Fill
97	12,221.44	12,000.83	4,265.43	4,265.36	0.07
98	12,222.47	11,950.84	4,265.29	4,265.17	0.13
99	12,223.49	11,900.85	4,265.40	4,265.19	0.21
100	12,224.51	11,850.86	4,265.48	4,265.28	0.20
101	12,225.53	11,800.87	4,265.55	4,265.44	0.11
106	12,275.52	11,801.71	4,275.00	4,274.85	0.15
107	12,274.50	11,851.70	4,275.00	4,274.87	0.13
108	12,273.48	11,801.69	4,275.00	4,274.84	0.16
109	12,272.46	11,951.68	4,275.00	4,274.97	0.03
110	12,271.44	12,001.67	4,275.00	4,274.87	0.14
111	12,321.43	12,002.50	4,285.00	4,284.77	0.23
112	12,322.45	11,952.51	4,285.00	4,284.83	0.07
113	12,323.47	11,902.52	4,285.00	4,284.78	0.22
114	12,324.49	11,852.53	4,285.00	4,284.95	0.05
115	12,325.52	11,802.54	4,285.00	4,284.81	0.19
120	12,375.51	11,803.38	4,295.00	4,293.84	1.16
121	12,374.49	11,853.37	4,295.00	4,294.85	0.15
122	12,373.47	11,903.36	4,295.00	4,294.78	0.22
123	12,372.45	11,953.34	4,295.00	4,294.81	0.19
124	12,371.42	12,003.43	4,295.00	4,294.80	0.20
125	12,381.42	12,003.51	4,297.00	4,296.82	0.18
126	12,382.44	11,953.52	4,297.00	4,296.88	0.12
127	12,383.47	11,903.53	4,297.00	4,296.80	0.10
128	12,384.49	11,853.40	4,297.00	4,296.85	0.15
129	12,385.51	11,803.55	4,297.00	4,296.81	0.39
132	12,425.50	11,804.22	4,298.60	4,298.42	0.19
133	12,424.48	11,854.21	4,298.60	4,298.36	0.24
134	12,423.46	11,904.20	4,298.60	4,298.39	0.21
135	12,422.44	11,954.20	4,298.60	4,298.29	0.31
136	12,421.42	12,004.18	4,298.60	4,298.43	0.17
137	12,540.00	12,056.16	4,303.38	4,303.27	0.11
138	12,540.00	12,106.17	4,303.42	4,303.38	0.04
139	12,540.00	12,156.18	4,303.47	4,303.28	0.19
140	12,540.00	12,206.19	4,303.51	4,303.41	0.10
141	12,540.00	12,256.19	4,303.55	4,303.37	0.18
142	12,540.00	12,306.20	4,301.59	4,301.41	0.18
143	12,525.00	12,305.95	4,302.60	4,301.72	0.88
144	12,525.00	12,355.96	4,300.60	4,300.54	0.06
145	12,525.00	12,405.97	4,298.60	4,298.32	0.28
146	12,525.00	12,445.97	4,297.00	4,296.67	0.33

GW-88			
	Northing	Easting	Elevation
Actual	13,897.43	12,707.84	4,276.93
Reshoot	13,897.46	12,707.78	4,276.93

\* A copy of the Debris Survey is Attached  
(Before native soil)

*[Signature]*  
QC Officer Approval

*10/9/02*  
Date

*[Signature]*  
QA Approval

*10-9-02*  
Date

05167341

AWA18/AWB18 (Top Slopes & Side Slopes)  
Top of Debris Before Debris Free Soil

Date: 8-01-02

Page 1 of 4

							137	138	139	140	141	142							
							1	2	3	4	5	6	7	8	9	10	11	12	13
							26	25	24	23	22	21	20	19	18	17	16	15	14
		132	133	134	135	136	27	28	29	30	31	32	33	34	35	36	37	38	39
131	130	129	128	127	126	125	52	53	54	55	56	57	58	59	60				
118	119	120	121	122	123	124	51	50	49	48	47	46	45	44	43	42	41	40	
117	116	115	114	113	112	111	72	71	70	69	68	67	66	65	64	63	62	61	
104	105	106	107	108	109	110	73	74	75	76	77	78	79	80	81	82	83	84	
103	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	



ORIGINAL

Page 3 of 4

Pt #	Northing	Eastng	Top of Waste Design	Actual Elev.	Fills to Design
47	12366.32	12253.29	4295.00	4293.64	1.37
48	12367.34	12203.30	4295.00	4293.75	1.25
49	12368.36	12153.31	4295.00	4293.64	1.36
50	12369.38	12103.32	4295.00	4293.87	1.13
51	12370.40	12053.33	4295.00	4293.83	1.17
52	12380.40	12053.50	4297.00	4295.67	1.33
53	12379.38	12103.49	4297.00	4295.80	1.20
54	12378.36	12153.48	4297.00	4295.71	1.29
55	12377.34	12203.47	4297.00	4295.65	1.35
56	12376.32	12253.46	4297.00	4295.74	1.26
57	12375.30	12303.45	4297.00	4295.69	1.31
58	12374.27	12353.44	4297.00	4295.62	1.38
59	12373.25	12403.43	4297.00	4295.68	1.32
60	12372.44	12443.42	4297.00	4295.60	1.40
61	12309.00	12602.38	4285.00	*	*
62	12310.20	12552.40	4275.00	4273.63	1.37
63	12311.22	12502.40	4285.00	4283.59	1.41
64	12312.24	12452.41	4285.00	4283.85	1.15
65	12313.26	12402.42	4285.00	4283.88	1.13
66	12314.28	12352.43	4285.00	4283.63	1.37
67	12315.30	12302.44	4285.00	4283.54	1.46
68	12316.33	12252.45	4285.00	4283.60	1.40
69	12317.35	12202.46	4285.00	4283.71	1.29
70	12318.37	12152.47	4285.00	4283.64	1.36
71	12319.39	12102.48	4285.00	4283.92	1.09
72	12320.41	12052.49	4285.00	4283.75	1.25
73	12270.41	12051.86	4275.00	4273.66	1.34
74	12269.40	12101.85	4275.00	4273.51	1.50
75	12268.37	12151.84	4275.00	4273.83	1.17
76	12267.35	12201.83	4275.00	4273.80	1.20
77	12266.33	12251.82	4275.00	4273.79	1.21
78	12265.31	12301.81	4275.00	4273.81	1.19
79	12264.29	12351.80	4275.00	4273.65	1.35
80	12263.27	12401.59	4275.00	4273.75	1.25
81	12262.25	12451.58	4275.00	4273.84	1.18
82	12261.23	12501.57	4275.00	4273.77	1.23
83	12260.20	12551.56	4275.00	4273.68	1.32
84	12259.18	12601.55	4285.00	*	*
85	12209.19	12600.71	4285.00	*	*
86	12210.21	12550.72	4285.00	*	*
87	12211.23	12500.73	4285.00	*	*
88	12212.25	12450.74	4285.00	*	*
89	12213.27	12400.75	4285.00	*	*
90	12214.30	12350.76	4285.00	*	*
91	12215.32	12300.77	4285.00	*	*
92	12216.34	12250.78	4285.00	*	*
93	12217.36	12200.79	4285.00	*	*
94	12218.38	12150.80	4285.00	*	*
95	12219.40	12100.81	4285.00	*	*
96	12220.42	12050.82	4285.00	*	*
97	12221.44	12000.83	4285.00	*	*
98	12222.47	11950.84	4285.00	*	*
99	12223.49	11900.85	4285.00	*	*
100	12224.51	11850.86	4285.00	*	*

ORIGINAL

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Pt #	Northing	Easting	Top of Waste Design	Actual Elev.	Fills to Design
101	12228.53	11800.87	4265.00	*	*
102	12228.55	11750.88	4265.00	*	*
103	12227.57	11700.89	4265.00	*	*
104	12277.56	11701.73	4275.00	4273.66	1.34
105	12276.54	11751.72	4275.00	4273.89	1.11
106	12275.52	11801.71	4275.00	4273.86	1.14
107	12274.50	11851.70	4275.00	4273.94	1.06
108	12273.48	11901.69	4275.00	4273.97	1.03
109	12272.46	11951.68	4275.00	4273.92	1.08
110	12271.44	12001.67	4275.00	4273.88	1.12
111	12321.43	12002.50	4285.00	4283.95	1.05
112	12322.45	11952.51	4285.00	4283.92	1.08
113	12323.47	11902.52	4285.00	4283.81	1.19
114	12324.49	11852.53	4285.00	4283.87	1.14
115	12325.52	11802.54	4285.00	4283.89	1.11
116	12326.54	11752.55	4285.00	4283.88	1.13
117	12327.56	11702.56	4285.00	4283.85	1.15
118	12377.55	11703.40	4295.00	4290.71	4.29
119	12376.53	11753.39	4295.00	4290.35	4.65
120	12375.51	11803.38	4295.00	4293.85	1.15
121	12374.49	11853.37	4295.00	4293.83	1.18
122	12373.47	11903.36	4295.00	4293.75	1.25
123	12372.45	11953.34	4295.00	4293.52	1.48
124	12371.42	12003.43	4295.00	4293.41	1.59
125	12381.42	12003.51	4297.00	4295.77	1.24
126	12382.44	11953.52	4297.00	4295.67	1.33
127	12383.47	11903.53	4297.00	4295.83	1.17
128	12384.49	11853.40	4297.00	4295.84	1.17
129	12385.51	11803.55	4297.00	4295.83	1.17
130	12385.53	11753.56	4297.00	4290.05	6.95
131	12387.55	11703.57	4297.00	4290.79	6.21
132	12425.50	11804.22	4298.60	4295.80	2.80
133	12424.48	11854.21	4298.60	4296.14	2.46
134	12423.46	11904.20	4298.60	4297.24	1.36
135	12422.44	11954.20	4298.60	4297.41	1.19
136	12421.42	12004.18	4298.60	4297.37	1.23
137	12540.00	12058.16	4303.38	*	*
138	12540.00	12108.17	4303.42	*	*
139	12540.00	12158.18	4303.47	*	*
140	12540.00	12208.19	4303.51	*	*
141	12540.00	12258.19	4303.55	*	*
142	12540.00	12308.20	4303.59	*	*
143	12528.00	12308.55	4302.60	*	*
144	12528.00	12358.56	4300.60	*	*
145	12528.00	12408.57	4298.60	*	*
146	12528.00	12448.57	4297.00	*	*

\* Protective Cover Previously Placed



ORIGINAL

## Class A Top of Waste Survey

Lift Area's: AWB12/B13 12/6/02

## Specification:

At or below design grade

Page 1 of 2

Pt #	Northing	Easting	Design Elevation	Actual Elevation	FH to Design
1003	12,231.66	11,500.93	4,265.70	4,265.61	0.09
1004	12,230.63	11,550.82	4,265.77	4,265.45	0.32
1005	12,229.61	11,600.91	4,265.87	4,265.42	0.45
1006	12,228.59	11,650.90	4,265.85	4,265.33	0.52
1007	12,227.57	11,700.89	4,265.81	4,265.54	0.28
1008	12,226.55	11,750.88	4,265.66	4,265.28	0.39
1009	12,278.59	11,651.74	4,275.00	4,274.73	0.27
1010	12,328.56	11,652.57	4,285.00	4,284.61	0.19
1011	12,378.57	11,653.41	4,295.00	4,294.74	0.26
1012	12,388.57	11,653.58	4,297.00	4,296.84	0.16
1014	12,331.64	11,502.60	4,285.00	4,284.83	0.17
1015	12,381.64	11,503.44	4,295.00	4,294.73	0.27
1016	12,391.63	11,503.61	4,297.00	4,296.80	0.20
1027	12,330.62	11,552.59	4,285.00	4,284.96	0.04
1028	12,329.60	11,602.58	4,285.00	4,284.88	0.14
1029	12,380.62	11,553.43	4,295.00	4,294.76	0.24
1030	12,379.59	11,603.42	4,295.00	4,294.89	0.11
1031	12,390.61	11,553.60	4,297.00	4,296.76	0.24
1032	12,389.59	11,603.59	4,297.00	4,297.00	0.00
1037	12,377.55	11,703.40	4,295.00	4,294.89	0.31
1038	12,387.55	11,703.57	4,297.00	4,296.89	0.11
1039	12,376.53	11,753.39	4,295.00	4,294.91	0.09
1040	12,386.53	11,753.56	4,297.00	4,296.87	0.13
1041	12,426.52	11,754.23	4,298.60	4,298.49	0.11
1042	12,427.54	11,704.24	4,298.60	4,298.41	0.19
1043	12,428.57	11,654.25	4,298.60	4,298.52	0.08
1044	12,429.59	11,604.26	4,298.60	4,298.54	0.07
308	12,279.61	11,601.75	4,275.00	4,274.91	0.09
309	12,280.63	11,551.76	4,275.00	4,274.93	0.07
310	12,281.65	11,501.77	4,275.00	4,274.87	0.14
101	12,275.53	11,600.87	4,265.55	4,265.44	0.11
104	12,277.56	11,701.73	4,275.00	4,274.71	0.29
105	12,276.54	11,751.72	4,275.00	4,274.81	0.19
106	12,275.52	11,801.71	4,275.00	4,274.85	0.15
115	12,325.52	11,802.54	4,285.00	4,284.81	0.19
116	12,326.54	11,752.55	4,285.00	4,284.78	0.22
117	12,327.56	11,702.56	4,285.00	4,284.80	0.20
120	12,375.51	11,803.38	4,295.00	4,293.84	1.16
129	12,385.51	11,803.65	4,297.00	4,296.61	0.39
132	12,425.50	11,804.22	4,298.60	4,298.42	0.18

GW-88

	Northing	Easting	Elevation
Actual	13,697.43	12,707.84	4,276.93
Reshoot	13,697.43	12,707.79	4,276.88

QC Officer Approval

Date

QA Approval

Date



DEPARTMENT OF THE ENVIRONMENT  
THE SAFE ALTERNATIVE

ORIGINAL

## Class A Top of Debris Survey

Lift Area's: B13/B12

Specification:

≥ one foot below  
Top of Waste Design

3  
Page 4 of 4  
10/11/07

PT #	Northing	Easting	Design Elevation	Actual Elevation	Fill to Design
1003	12,231.88	11,600.93	4,265.70	4,265.70	0.00
1004	12,230.83	11,660.92	4,265.77	4,265.52	0.25
1005	12,229.91	11,600.91	4,265.87	4,265.63	0.24
1006	12,228.59	11,660.90	4,265.86	4,265.82	0.03
1007	12,227.57	11,700.89	4,265.81	4,265.83	0.18
1008	12,226.55	11,750.88	4,265.86	4,265.50	0.18
1009	12,278.59	11,651.74	4,275.00	4,273.90	1.10
1010	12,328.58	11,652.57	4,285.00	4,283.96	1.04
1011	12,378.57	11,653.41	4,295.00	4,293.74	1.27
1012	12,388.57	11,653.58	4,297.00	4,295.98	1.02
1014	12,331.64	11,502.60	4,285.00	4,283.61	1.39
1015	12,381.64	11,503.44	4,295.00	4,293.66	1.34
1016	12,391.63	11,503.61	4,297.00	4,295.97	1.03
1027	12,330.62	11,552.59	4,285.00	4,283.93	1.07
1028	12,329.60	11,602.58	4,285.00	4,283.84	1.16
1029	12,380.62	11,553.43	4,295.00	4,293.83	1.17
1030	12,379.59	11,603.42	4,295.00	4,293.98	1.02
1031	12,390.61	11,553.60	4,297.00	4,295.90	1.10
1032	12,389.59	11,603.59	4,297.00	4,295.77	1.23
1037	12,377.55	11,703.40	4,295.00	4,293.70	1.30
1038	12,387.55	11,703.57	4,297.00	4,295.89	1.11
1039	12,376.53	11,753.39	4,295.00	4,293.94	1.06
1040	12,386.53	11,753.56	4,297.00	4,295.98	1.02
1041	12,426.52	11,754.23	4,298.80	4,297.24	1.37
1042	12,427.54	11,704.24	4,298.80	4,297.44	1.16
1043	12,428.57	11,654.25	4,298.80	4,297.39	1.21
1044	12,429.59	11,604.26	4,298.80	4,297.51	1.09
A308	12,279.61	11,601.75	4,275.00	4,273.78	1.22
A309	12,280.63	11,551.76	4,275.00	4,273.86	1.14
A310	12,281.65	11,501.77	4,275.00	4,273.87	1.34
104	12277.56	11701.73	4275.00	4273.86	1.34
105	12278.54	11751.72	4275.00	4273.89	1.11
116	12326.54	11752.55	4285.00	4283.88	1.13
117	12327.56	11702.56	4285.00	4283.85	1.15

Class A Top of Debris Survey  
Lift Area's: B13/B12  
Date: 10-29-02  
Surveyed By: Travis Sutherland

Page 4 of 4  
points

NORTH

1016 N 12,391.63 E 11,503.61 TOW D 4,297.00 TOD A 4,295.97 FILL 103	1021 N 12,390.61 E 11,553.60 TOW D 4,297.00 TOD A 4,295.90 FILL 110	1044 N 12,429.59 E 11,604.26 TOW D 4,298.60 TOD A 4,297.51 FILL 109	1043 N 12,428.57 E 11,634.25 TOW D 4,298.60 TOD A 4,297.39 FILL 121	1042 N 12,427.54 E 11,704.24 TOW D 4,298.60 TOD A 4,297.44 FILL 116	1041 N 12,426.52 E 11,754.23 TOW D 4,298.60 TOD A 4,297.24 FILL 137
1015 N 12,381.64 E 11,503.44 TOW D 4,295.80 TOD A 4,293.64 FILL 134	1029 N 12,380.62 E 11,553.43 TOW D 4,295.00 TOD A 4,293.83 FILL 117	1032 N 12,389.59 E 11,603.59 TOW D 4,297.00 TOD A 4,295.77 FILL 123	1012 N 12,388.57 E 11,653.58 TOW D 4,297.00 TOD A 4,295.98 FILL 102	1038 N 12,387.55 E 11,703.57 TOW D 4,297.00 TOD A 4,295.89 FILL 131	1040 N 12,386.53 E 11,753.56 TOW D 4,297.00 TOD A 4,295.98 FILL 102
1014 N 12,331.64 E 11,582.60 TOW D 4,285.80 TOD A 4,283.61 FILL 139	1027 N 12,330.62 E 11,552.59 TOW D 4,285.00 TOD A 4,283.93 FILL 107	1030 N 12,379.59 E 11,603.42 TOW D 4,295.00 TOD A 4,293.98 FILL 102	1011 N 12,378.57 E 11,653.41 TOW D 4,295.00 TOD A 4,293.74 FILL 127	1037 N 12,377.55 E 11,703.40 TOW D 4,295.00 TOD A 4,293.70 FILL 130	1039 N 12,376.53 E 11,753.39 TOW D 4,295.00 TOD A 4,293.94 FILL 106
A310 N 12,281.65 E 11,501.77 TOW D 4,275.00 TOD A 4,273.67 FILL 134	A309 N 12,280.63 E 11,551.76 TOW D 4,275.00 TOD A 4,273.86 FILL 114	1028 N 12,329.60 E 11,602.58 TOW D 4,285.80 TOD A 4,283.84 FILL 116	1010 N 12,328.58 E 11,652.57 TOW D 4,285.00 TOD A 4,283.96 FILL 184	117 N 12,327.56 E 11,702.56 TOW D 4,285.00 TOD A 4,283.85 FILL 115	116 N 12,326.54 E 11,752.55 TOW D 4,285.00 TOD A 4,283.88 FILL 113
A310 N 12,281.65 E 11,501.77 TOW D 4,275.00 TOD A 4,273.67 FILL 134	A309 N 12,280.63 E 11,551.76 TOW D 4,275.00 TOD A 4,273.86 FILL 114	A308 N 12,279.61 E 11,601.75 TOW D 4,275.00 TOD A 4,273.78 FILL 122	1009 N 12,278.59 E 11,651.74 TOW D 4,275.00 TOD A 4,273.90 FILL 110	104 N 12,277.56 E 11,701.73 TOW D 4,275.00 TOD A 4,273.66 FILL 134	103 N 12,276.54 E 11,751.72 TOW D 4,275.00 TOD A 4,273.89 FILL 111

Key

Point #  
N: Northing  
E: Easting  
TOW D: Top of Waste (Design)  
TOD A: Top of Debris (Actual)  
FILL: Fill to Design

1003 N 12,231.66 E 11,500.93 TOW D 4,265.70 TOD A 4,265.70 FILL 000	1004 N 12,230.63 E 11,550.92 TOW D 4,265.77 TOD A 4,265.52 FILL 026	1005 N 12,229.61 E 11,600.91 TOW D 4,265.87 TOD A 4,265.63 FILL 024	1006 N 12,228.59 E 11,650.90 TOW D 4,265.85 TOD A 4,265.62 FILL 023	1007 N 12,227.57 E 11,700.89 TOW D 4,265.81 TOD A 4,265.63 FILL 018	1008 N 12,226.55 E 11,750.88 TOW D 4,265.66 TOD A 4,265.50 FILL 016
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Debris Free (Native Soil)  
Previously placed (Toe of Waste)

**ENVIROCARE**  
OF UTAH, INC.  
THE SAFE ALTERNATIVE



ENVIRONMENTAL WASTE  
ALTERNATIVES, INC.  
THE WASTE ALTERNATIVE

ORIGINAL

### Class A Top of Waste Survey

Lift Area's: E6, F9, B6 & C10

**Specification:**

At or Below Top of Waste Design

Date: 3/25/03

Page 1 of 3

Pt #	Northing	Easting	Top of Waste Design Elevation	Top of Waste Actual Elevation	Fill to Design
1001	12,541.01	11,045.95	4,302.60	4,302.42	0.18
1002	12,491.02	11,045.11	4,300.60	4,300.47	0.13
1003	12,441.03	11,044.27	4,298.60	4,298.39	0.21
1004	12,401.03	11,043.60	4,297.00	4,296.81	0.19
1005	12,391.03	11,043.43	4,295.00	4,294.87	0.13
1006	12,341.04	11,042.59	4,265.00	4,284.93	0.07
1007	12,291.05	11,041.75	4,275.00	4,274.83	0.17
1008	12,241.05	11,040.91	4,266.12	4,265.82	0.30
1009	12,492.04	10,995.12	4,300.60	4,300.48	0.13
1010	12,493.06	10,945.13	4,300.60	4,300.44	0.16
1011	12,242.07	10,990.92	4,266.13	4,265.89	0.24
1012	12,243.10	10,940.93	4,265.95	4,265.72	0.23
1013	12,442.05	10,994.28	4,298.60	4,298.40	0.20
1014	12,443.07	10,944.29	4,298.60	4,298.40	0.20
1015	12,402.05	10,993.61	4,297.00	4,296.89	0.11
1016	12,403.07	10,943.62	4,297.00	4,296.77	0.23
1017	12,392.05	10,993.44	4,295.00	4,294.91	0.09
1018	12,393.08	10,943.45	4,295.00	4,294.91	0.09
1019	12,342.06	10,992.60	4,285.00	4,284.86	0.14
1020	12,343.08	10,942.61	4,285.00	4,284.94	0.06
1021	12,292.07	10,991.76	4,275.00	4,274.80	0.20
1022	12,293.09	10,941.77	4,275.00	4,274.91	0.09
1023	12,542.03	10,995.96	4,302.60	4,302.49	0.11
1024	12,543.06	10,945.97	4,302.60	4,302.53	0.07
1025	12,487.96	11,195.08	4,300.60	4,300.41	0.19
1026	12,488.98	11,145.09	4,300.60	4,300.38	0.22
1027	12,490.00	11,095.10	4,300.60	4,300.47	0.13
1028	12,237.99	11,190.88	4,265.78	4,265.72	0.06
1029	12,239.01	11,140.89	4,266.05	4,265.77	0.28
1030	12,240.03	11,090.90	4,266.05	4,265.82	0.24
1031	12,437.96	11,194.24	4,298.60	4,298.46	0.14
1032	12,397.97	11,193.57	4,297.00	4,296.78	0.22
1033	12,387.97	11,193.40	4,295.00	4,294.90	0.10
1034	12,337.98	11,192.56	4,285.00	4,284.91	0.09
1035	12,287.98	11,191.72	4,275.00	4,274.86	0.15
1036	12,438.98	11,144.25	4,298.60	4,298.53	0.07
1037	12,440.01	11,094.26	4,298.60	4,298.42	0.18
1038	12,398.99	11,143.58	4,297.00	4,296.78	0.22
1039	12,400.01	11,093.59	4,297.00	4,296.85	0.15
1040	12,388.99	11,143.41	4,295.00	4,294.94	0.06

Pt #	Northing	Easting	Top of Waste Design Elevation	Top of Waste Actual Elevation	Fill to Design
1041	12,390.01	11,093.42	4,295.00	4,294.87	0.13
1042	12,339.00	11,142.57	4,285.00	4,284.90	0.10
1043	12,340.02	11,092.58	4,285.00	4,284.92	0.08
1044	12,289.00	11,141.73	4,275.00	4,274.89	0.11
1045	12,290.03	11,091.74	4,275.00	4,274.92	0.08
1046	12,537.95	11,195.92	4,302.60	4,302.46	0.14
1047	12,538.97	11,145.93	4,302.60	4,302.46	0.14
1048	12,539.99	11,095.94	4,302.60	4,302.42	0.18
1049	12,586.92	11,246.75	4,304.60	4,304.46	0.14
1050	12,587.94	11,196.76	4,304.60	4,304.47	0.13
1051	12,588.96	11,146.77	4,304.60	4,304.49	0.11
1052	12,589.99	11,096.78	4,304.60	4,304.38	0.22
1053	12,536.93	11,245.91	4,302.60	4,302.42	0.18
1054	12,486.94	11,245.07	4,300.60	4,300.37	0.23
1055	12,436.94	11,244.23	4,298.60	4,298.47	0.13
1056	12,396.95	11,243.56	4,297.00	4,296.87	0.14
1057	12,386.95	11,243.39	4,295.00	4,294.85	0.15
1058	12,336.96	11,242.55	4,285.00	4,284.91	0.09
1059	12,286.96	11,241.71	4,275.00	4,274.80	0.20
1060	12,236.97	11,240.87	4,265.90	4,265.87	0.03

GW-89

	Northing	Easting	Elevation
Actual	13,303.82	12,701.86	4,276.83
Reshoot	13,303.77	12,701.84	4,276.80

QC Officer Approval

Date

QA Approval

Date

*[Signature]* 3/28/03 *D. Young* 4 3-27-03

Class A Top of Waste  
AWH20/AWC20 SlopesSurveyed By Reed BaygenterDate 11/2/01

PT. #	Northing	Easting	Target	Actual	Fill
1	12762.39	12449.94	4297.00	4298.48	0.5
2	12712.39	12449.10	4297.00	4296.40	0.6
3	12662.40	12448.27	4297.00	4296.49	0.5
4	12612.41	12447.43	4297.00	4296.45	0.5
5	12562.41	12446.60	4297.00	4296.38	0.6
6	12512.42	12445.76	4297.00	4296.16	0.8
7	12512.21	12455.76	4295.00	4294.48	0.5
8	12562.21	12456.59	4295.00	4294.23	0.8
9	12612.20	12457.43	4295.00	4294.12	0.9
10	12662.19	12458.27	4295.00	4294.56	0.4
11	12712.19	12459.10	4295.00	4294.83	0.2
12	12762.18	12459.94	4295.00	4294.64	0.4
13	12761.16	12509.93	4285.00	4284.97	0.0
14	12711.17	12509.09	4285.00	4284.73	0.3
15	12661.17	12508.25	4285.00	4284.88	0.1
16	12611.18	12507.42	4285.00	4284.91	0.1
17	12561.19	12506.58	4285.00	4284.79	0.2
18	12511.19	12505.75	4285.00	4284.64	0.4
19	12510.17	12555.74	4275.00	4274.66	0.3
20	12560.17	12556.57	4275.00	4274.71	0.3
21	12610.16	12557.41	4275.00	4274.59	0.4
22	12660.15	12558.24	4275.00	4274.70	0.3
23	12710.15	12559.08	4275.00	4274.49	0.5
24	12760.14	12559.92	4275.00	4273.58	1.4
25	12759.12	12609.91	4265.82	4265.81	0.0
26	12709.12	12609.07	4266.37	4265.48	0.9
27	12659.13	12608.23	4265.60	4265.37	0.2
28	12609.14	12607.40	4265.44	4265.14	0.3
29	12559.14	12606.56	4265.38	4265.16	0.2
30	12509.15	12605.73	4265.57	4265.20	0.4

Backsight check GW-69			
	Northing	Easting	Elevation
reshoot	13303.63	12701.86	4276.62
actual	13303.82	12701.86	4276.63
diff.	-0.02	0.00	0.01

QC Officer Approval

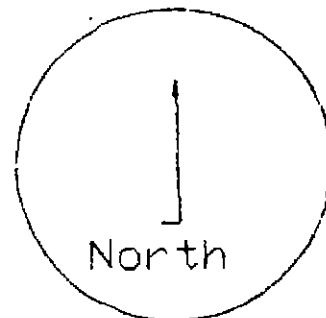
Date

QA Engineer Approval

Date

ORIGINAL

**Class A Top of Waste  
AWH20/AWC20 (East Slope)**



4,297.00 4,296.48 0.52	4,295.00 4,294.64 0.36	4,285.00 4,284.97 0.03	4,275.00 4,273.58 1.42	4,265.82 4,265.81 0.01
4,297.00 4,296.40 0.60	4,295.00 4,294.82 0.17	4,285.00 4,284.73 0.27	4,275.00 4,274.49 0.51	4,266.37 4,265.48 0.89
4,297.00 4,296.45 0.55	4,295.00 4,294.56 0.44	4,285.00 4,284.88 0.13	4,275.00 4,274.70 0.30	4,265.60 4,265.37 0.23
4,297.00 4,296.36 0.64	4,295.00 4,294.12 0.88	4,285.00 4,284.91 0.09	4,275.00 4,274.59 0.41	4,265.44 4,265.14 0.30
4,297.00 4,296.16 0.84	4,295.00 4,294.23 0.77	4,285.00 4,284.79 0.21	4,275.00 4,274.71 0.29	4,265.38 4,265.16 0.22
	4,295.00 4,294.48 0.52	4,285.00 4,284.64 0.36	4,275.00 4,274.66 0.34	4,265.57 4,265.20 0.37

**Key**

**Target = top number**  
**Actual = middle number**  
**Fill = bottom number**

ORIGINAL

## CLASS A (Top of Waste)

Page 1 of 2

PT. #	Northing	Easting	Design Elevation	Actual Elevation	Fill
1	12762.39	12449.94	4297.00	4296.58	0.42
2	12712.39	12449.10	4297.00	4296.76	0.24
3	12662.40	12448.27	4297.00	4296.92	0.08
4	12612.41	12447.43	4297.00	4296.71	0.29
5	12562.41	12446.60	4297.00	4296.82	0.08
6	12563.23	12406.80	4298.60	4298.47	0.13
7	12613.22	12407.44	4298.60	4298.46	0.14
8	12663.22	12408.28	4298.60	4298.47	0.13
9	12712.21	12409.11	4298.60	4298.46	0.14
10	12763.20	12409.95	4298.60	4298.40	0.20
11	12784.22	12359.96	4300.60	4300.53	0.07
12	12714.23	12359.12	4300.60	4300.55	0.05
13	12664.24	12358.29	4300.60	4300.53	0.08
14	12614.24	12357.46	4300.60	4300.52	0.08
15	12564.25	12356.61	4300.60	4300.49	0.11
16	12565.27	12306.62	4302.60	4302.38	0.22
17	12615.26	12307.46	4302.60	4302.40	0.20
18	12665.26	12308.30	4302.60	4302.39	0.22
19	12715.25	12309.13	4302.60	4302.47	0.13
20	12765.24	12309.97	4302.60	4302.33	0.27
21	12525.00	12445.97	4297.00	4296.80	0.20
22	12525.00	12405.97	4298.60	4298.42	0.18
23	12525.00	12355.96	4300.60	4300.50	0.10
24	12525.00	12305.95	4302.60	4302.23	0.37
25	12720.36	12056.18	4310.60	4310.41	0.19
26	12670.36	12056.35	4308.60	4308.45	0.16
27	12668.34	12106.34	4308.60	4308.36	0.24
28	12719.34	12106.17	4310.60	4310.33	0.27
29	12769.33	12110.01	4310.60	4310.28	0.32
30	12768.31	12160.00	4308.60	4308.25	0.36
31	12718.31	12159.16	4308.60	4308.26	0.34
32	12668.32	12158.33	4308.60	4308.14	0.46
33	12667.30	12208.32	4306.60	4306.37	0.23
34	12717.29	12209.15	4306.60	4306.44	0.16
35	12767.29	12209.99	4306.60	4306.28	0.32
36	12766.27	12259.98	4304.60	4304.31	0.29
37	12716.27	12259.14	4304.60	4304.53	0.07
38	12666.28	*12258.31	4304.60	4304.41	0.19

Lift Area's  
AWH17, AWH18, AWH20 & AWC20

Surveyed By: Brennan DickDate: 12/10/01

**Backsight Reshoot**  
**OW-89**

	Northing	Easting	Elevation
Reshoot	13303.82	12701.68	4276.78
Actual	13303.82	12701.86	4276.83
Difference	0.00	0.02	-0.05

Specification: At or below design grade elevation

[Signature]  
Q.C. Officer Approval

12/10/01  
Date

[Signature]  
QA Approval

12-12-01  
Date

# CLASS A TOP OF WASTE AWH17, AWH18, AWH20 & AWC20 page 2 of 2

## KEY

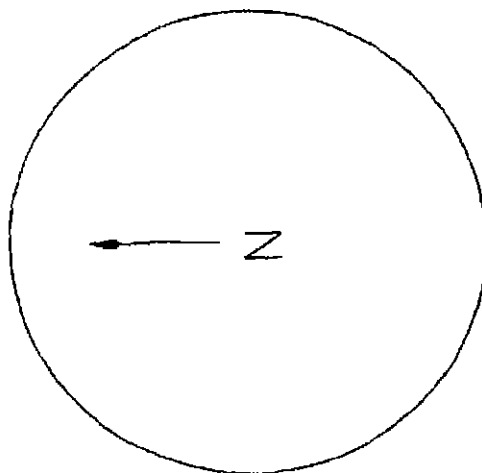
Point Number

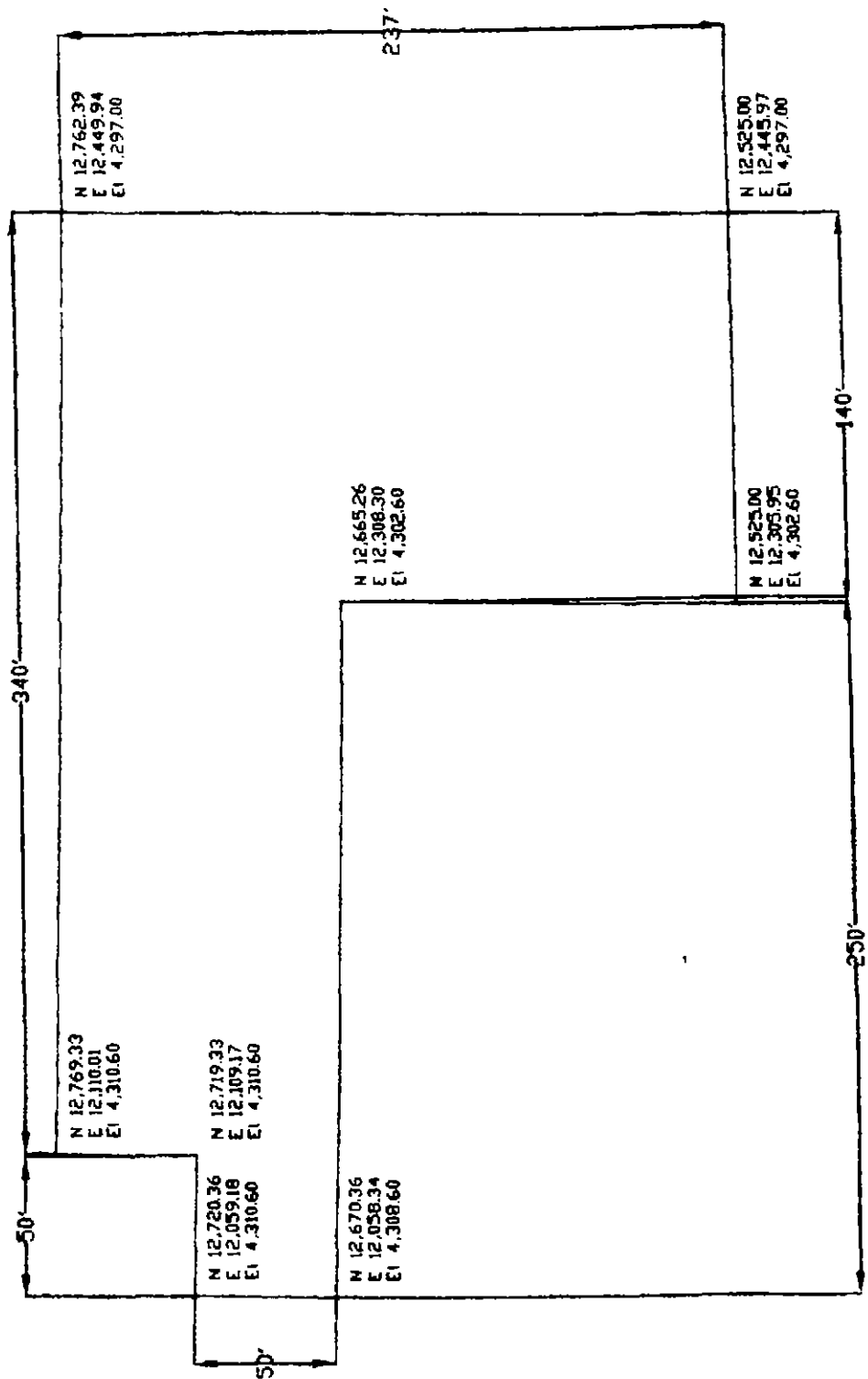
Design Elevation

Actual Elevation

Amount of Fill to Design

Pt# 29 4,310.60 4,310.28 0.32	Pt# 30 4,308.60 4,308.24 0.36	Pt# 35 4,306.60 4,306.28 0.32	Pt# 36 4,304.60 4,304.31 0.29	Pt# 20 4,302.60 4,302.33 0.27	Pt# 11 4,300.60 4,300.53 0.07	Pt# 10 4,298.60 4,298.40 0.20	Pt# 1 4,297.00 4,296.58 0.42
Pt# 25 4,310.60 4,310.41 0.19	Pt# 31 4,308.60 4,308.26 0.34	Pt# 34 4,306.60 4,306.44 0.16	Pt# 37 4,304.60 4,304.53 0.07	Pt# 19 4,302.60 4,302.47 0.13	Pt# 12 4,300.60 4,300.55 0.05	Pt# 9 4,298.60 4,298.46 0.14	Pt# 2 4,297.00 4,296.76 0.24
Pt# 26 4,308.60 4,308.44 0.16	Pt# 32 4,308.60 4,308.14 0.46	Pt# 33 4,306.60 4,306.37 0.23	Pt# 38 4,304.60 4,304.41 0.19	Pt# 18 4,302.60 4,302.39 0.22	Pt# 13 4,300.60 4,300.52 0.08	Pt# 8 4,298.60 4,298.47 0.13	Pt# 3 4,297.00 4,296.92 0.08
				Pt# 17 4,302.60 4,302.40 0.20	Pt# 14 4,300.60 4,300.52 0.08	Pt# 7 4,298.60 4,298.46 0.14	Pt# 4 4,297.00 4,296.71 0.29
				Pt# 16 4,302.60 4,302.38 0.22	Pt# 15 4,300.60 4,300.49 0.11	Pt# 6 4,298.60 4,298.47 0.13	Pt# 5 4,297.00 4,296.92 0.08
				Pt# 24 4,302.60 4,302.23 0.37	Pt# 23 4,300.60 4,300.50 0.10	Pt# 22 4,298.60 4,298.42 0.18	Pt# 21 4,297.00 4,296.80 0.20





# ORIGINAL

## E6-B6-F9 & C10

### 3-25-03

### (page 3 of 3)



1052 N 12,589.99 E 11,096.78 Design 4,304.60 Actual 4,304.38	1051 N 12,588.96 E 11,146.77 Design 4,304.60 Actual 4,304.49	1050 N 12,587.94 E 11,196.76 Design 4,304.60 Actual 4,304.47	1049 N 12,586.92 E 11,246.75 Design 4,304.60 Actual 4,304.46
1024 N 12,543.06 E 10,945.97 Design 4,302.60 Actual 4,302.53	1023 N 12,542.03 E 10,995.96 Design 4,302.60 Actual 4,302.49	1001 N 12,541.81 E 11,045.95 Design 4,302.68 Actual 4,302.42	1048 N 12,539.99 E 11,095.94 Design 4,302.60 Actual 4,302.42
1047 N 12,538.97 E 11,145.93 Design 4,302.60 Actual 4,302.46	1046 N 12,537.95 E 11,195.92 Design 4,302.60 Actual 4,302.46	1053 N 12,536.93 E 11,245.91 Design 4,302.60 Actual 4,302.42	
1010 N 12,493.86 E 10,945.13 Design 4,300.60 Actual 4,300.44	1009 N 12,492.84 E 10,995.12 Design 4,300.60 Actual 4,300.48	1002 N 12,491.82 E 11,045.11 Design 4,300.60 Actual 4,300.47	1027 N 12,490.00 E 11,095.10 Design 4,300.60 Actual 4,300.47
1026 N 12,488.98 E 11,145.09 Design 4,300.60 Actual 4,300.38	1025 N 12,487.96 E 11,195.08 Design 4,300.60 Actual 4,300.41	1054 N 12,486.94 E 11,245.07 Design 4,300.60 Actual 4,300.37	
1014 N 12,443.07 E 10,944.29 Design 4,298.60 Actual 4,298.48	1013 N 12,442.05 E 10,994.28 Design 4,298.60 Actual 4,298.40	1003 N 12,441.83 E 11,044.27 Design 4,298.60 Actual 4,298.39	1037 N 12,440.01 E 11,094.26 Design 4,298.60 Actual 4,298.42
1036 N 12,438.98 E 11,144.25 Design 4,298.60 Actual 4,298.32	1031 N 12,437.96 E 11,194.24 Design 4,298.60 Actual 4,298.46	1055 N 12,436.94 E 11,244.23 Design 4,298.60 Actual 4,298.47	
1016 N 12,403.07 E 10,943.62 Design 4,297.00 Actual 4,296.77	1015 N 12,402.05 E 10,993.61 Design 4,297.00 Actual 4,296.89	1004 N 12,401.83 E 11,043.60 Design 4,297.00 Actual 4,296.81	1039 N 12,400.01 E 11,093.59 Design 4,297.00 Actual 4,296.85
1038 N 12,398.99 E 11,143.58 Design 4,297.00 Actual 4,296.78	1032 N 12,397.97 E 11,193.57 Design 4,297.00 Actual 4,296.78	1056 N 12,396.95 E 11,243.56 Design 4,297.00 Actual 4,296.87	
1018 N 12,393.88 E 10,943.45 Design 4,295.00 Actual 4,294.91	1017 N 12,392.85 E 10,993.44 Design 4,295.00 Actual 4,294.91	1005 N 12,391.83 E 11,043.43 Design 4,295.00 Actual 4,294.87	1041 N 12,390.01 E 11,093.42 Design 4,295.00 Actual 4,294.87
1040 N 12,388.99 E 11,143.41 Design 4,295.00 Actual 4,294.94	1033 N 12,387.97 E 11,193.40 Design 4,295.00 Actual 4,294.90	1057 N 12,386.95 E 11,243.39 Design 4,295.00 Actual 4,294.85	
1020 N 12,343.88 E 10,942.61 Design 4,285.00 Actual 4,284.94	1019 N 12,342.86 E 10,992.60 Design 4,285.00 Actual 4,284.86	1006 N 12,341.84 E 11,042.59 Design 4,285.00 Actual 4,284.93	1042 N 12,340.02 E 11,092.58 Design 4,285.00 Actual 4,284.92
1042 N 12,339.00 E 11,142.57 Design 4,285.00 Actual 4,284.90	1034 N 12,337.98 E 11,192.56 Design 4,285.00 Actual 4,284.91	1058 N 12,336.96 E 11,242.55 Design 4,285.00 Actual 4,284.91	
1022 N 12,293.09 E 10,941.77 Design 4,275.00 Actual 4,274.91	1021 N 12,292.07 E 10,991.76 Design 4,275.00 Actual 4,274.88	1007 N 12,291.85 E 11,041.75 Design 4,275.00 Actual 4,274.83	1045 N 12,290.03 E 11,091.74 Design 4,275.00 Actual 4,274.92
1044 N 12,288.99 E 11,141.73 Design 4,275.00 Actual 4,274.89	1035 N 12,287.98 E 11,191.72 Design 4,275.00 Actual 4,274.86	1059 N 12,286.96 E 11,241.71 Design 4,275.00 Actual 4,274.80	
1012 N 12,243.10 E 10,940.93 Design 4,265.95 Actual 4,265.72	1011 N 12,242.07 E 10,990.92 Design 4,266.13 Actual 4,265.89	1008 N 12,241.05 E 11,040.91 Design 4,266.12 Actual 4,265.82	1036 N 12,240.03 E 11,090.90 Design 4,266.05 Actual 4,265.82
1029 N 12,239.01 E 11,140.89 Design 4,266.05 Actual 4,265.77	1028 N 12,237.99 E 11,190.88 Design 4,265.78 Actual 4,265.72	1060 N 12,236.97 E 11,240.87 Design 4,265.90 Actual 4,265.87	



DEPARTMENT OF THE ENVIRONMENT  
AND NATURAL RESOURCES  
WASTE MANAGEMENT DIVISION

ORIGINAL

### Class A Top of Debris Survey

Lift Area's: E6, F9, B6 & C10

**Specification:**

≥ 1 foot below Top of Waste Design

Date: 3/04/03

Page 1 of 3

Pt #	Northing	Easting	Top of Waste Design Elevation	Top of Debris Actual Elevation	Fill to Top of Waste
1001	12,541.01	11,045.95	4,302.60	4,301.55	1.05
1002	12,491.02	11,045.11	4,300.60	4,299.38	1.22
1003	12,441.03	11,044.27	4,298.60	4,297.34	1.26
1004	12,401.03	11,043.60	4,297.00	4,295.78	1.22
1005	12,391.03	11,043.43	4,295.00	4,293.84	1.16
1006	12,341.04	11,042.59	4,285.00	4,283.81	1.19
1007	12,291.05	11,041.75	4,275.00	4,273.80	1.20
* 1008	12,241.05	11,040.91	4,266.12	4,265.68	0.44
1009	12,492.04	10,995.12	4,300.60	4,299.26	1.34
1010	12,493.06	10,945.13	4,300.60	4,299.41	1.19
* 1011	12,242.07	10,990.92	4,266.13	4,265.81	0.32
* 1012	12,243.10	10,940.93	4,265.95	4,265.86	0.09
1013	12,442.05	10,994.28	4,298.60	4,297.27	1.33
1014	12,443.07	10,944.29	4,298.60	4,297.47	1.13
1015	12,402.05	10,993.61	4,297.00	4,295.64	1.36
1016	12,403.07	10,943.62	4,297.00	4,295.71	1.29
1017	12,392.05	10,993.44	4,295.00	4,293.84	1.16
1018	12,393.08	10,943.45	4,295.00	4,293.85	1.15
1019	12,342.06	10,992.60	4,285.00	4,283.82	1.18
1020	12,343.08	10,942.61	4,285.00	4,283.86	1.15
1021	12,292.07	10,991.76	4,275.00	4,273.91	1.09
1022	12,293.09	10,941.77	4,275.00	4,273.86	1.14
1023	12,542.03	10,995.96	4,302.60	4,301.36	1.24
1024	12,543.06	10,945.97	4,302.60	4,301.48	1.12
1025	12,487.96	11,195.08	4,300.60	4,299.51	1.09
1026	12,488.98	11,145.09	4,300.60	4,299.37	1.23
1027	12,490.00	11,095.10	4,300.60	4,299.32	1.28
* 1028	12,237.99	11,190.88	4,265.41	4,265.39	0.02
* 1029	12,239.01	11,140.89	4,265.70	4,265.33	0.37
* 1030	12,240.03	11,090.90	4,266.05	4,265.98	0.07
1031	12,437.96	11,194.24	4,298.60	4,297.39	1.21
1032	12,397.97	11,193.57	4,297.00	4,295.89	1.11
1033	12,387.97	11,193.40	4,295.00	4,293.80	1.20
1034	12,337.98	11,192.56	4,285.00	4,283.94	1.06
1035	12,287.98	11,191.72	4,275.00	4,273.98	1.02
1036	12,438.98	11,144.25	4,298.60	4,297.44	1.16
1037	12,440.01	11,094.26	4,298.60	4,297.52	1.08
1038	12,398.99	11,143.58	4,297.00	4,295.87	1.13
1039	12,400.01	11,093.59	4,297.00	4,295.76	1.24
1040	12,388.99	11,143.41	4,295.00	4,293.81	1.19



E6-B6-FS & C10

3-04-03

(page 3 of 3)

1024 N 12,543.06 E 10,945.97 TDV El 4,302.60 Actual El 4,301.48 FRI 112	1023 N 12,542.03 E 10,995.96 TDV El 4,302.60 Actual El 4,301.36 FRI 124	1001 N 12,541.01 E 11,045.95 TDV El 4,302.60 Actual El 4,301.55 FRI 105	1048 N 12,539.99 E 11,095.94 TDV El 4,302.60 Actual El 4,301.55 FRI 105	1051 N 12,508.96 E 11,146.77 TDV El 4,304.60 Actual El 4,303.34 FRI 126	1050 N 12,507.94 E 11,196.76 TDV El 4,304.60 Actual El 4,303.35 FRI 105	1049 N 12,506.92 E 11,246.75 TDV El 4,304.60 Actual El 4,303.42 FRI 118
1010 N 12,492.06 E 10,945.13 TDV El 4,300.60 Actual El 4,299.41 FRI 119	1009 N 12,492.04 E 10,995.12 TDV El 4,300.60 Actual El 4,299.26 FRI 134	1002 N 12,491.02 E 11,045.11 TDV El 4,300.60 Actual El 4,299.38 FRI 122	1027 N 12,490.00 E 11,095.10 TDV El 4,300.60 Actual El 4,299.32 FRI 128	1026 N 12,488.98 E 11,145.09 TDV El 4,300.60 Actual El 4,299.37 FRI 123	1025 N 12,487.96 E 11,195.08 TDV El 4,300.60 Actual El 4,299.51 FRI 109	1054 N 12,486.94 E 11,245.07 TDV El 4,300.60 Actual El 4,299.44 FRI 116
1014 N 12,443.07 E 10,943.29 TDV El 4,298.60 Actual El 4,297.47 FRI 113	1013 N 12,442.05 E 10,994.28 TDV El 4,298.60 Actual El 4,297.27 FRI 133	1003 N 12,441.03 E 11,044.27 TDV El 4,298.60 Actual El 4,297.34 FRI 126	1037 N 12,440.01 E 11,094.26 TDV El 4,298.60 Actual El 4,297.32 FRI 108	1036 N 12,438.98 E 11,144.25 TDV El 4,298.60 Actual El 4,297.44 FRI 116	1031 N 12,437.96 E 11,194.24 TDV El 4,298.60 Actual El 4,297.39 FRI 121	1055 N 12,436.94 E 11,244.23 TDV El 4,298.60 Actual El 4,297.42 FRI 118
1016 N 12,403.07 E 10,943.62 TDV El 4,297.00 Actual El 4,295.71 FRI 129	1015 N 12,402.05 E 10,993.61 TDV El 4,297.00 Actual El 4,295.44 FRI 136	1004 N 12,401.03 E 11,043.60 TDV El 4,297.00 Actual El 4,295.78 FRI 122	1039 N 12,400.01 E 11,093.59 TDV El 4,297.00 Actual El 4,295.76 FRI 124	1038 N 12,398.99 E 11,143.58 TDV El 4,297.00 Actual El 4,295.87 FRI 112	1032 N 12,397.97 E 11,193.57 TDV El 4,297.00 Actual El 4,295.89 FRI 131	1056 N 12,396.95 E 11,243.56 TDV El 4,297.00 Actual El 4,295.75 FRI 125
1018 N 12,393.08 E 10,943.45 TDV El 4,295.00 Actual El 4,293.85 FRI 115	1017 N 12,392.05 E 10,993.44 TDV El 4,295.00 Actual El 4,293.84 FRI 116	1005 N 12,391.03 E 11,043.43 TDV El 4,295.00 Actual El 4,293.84 FRI 136	1041 N 12,390.01 E 11,093.42 TDV El 4,295.00 Actual El 4,293.92 FRI 108	1040 N 12,388.99 E 11,143.41 TDV El 4,295.00 Actual El 4,293.81 FRI 119	1033 N 12,387.97 E 11,193.40 TDV El 4,295.00 Actual El 4,293.80 FRI 120	1057 N 12,386.95 E 11,243.39 TDV El 4,295.00 Actual El 4,293.68 FRI 132
1020 N 12,343.08 E 10,942.61 TDV El 4,285.00 Actual El 4,283.86 FRI 115	1019 N 12,342.06 E 10,992.60 TDV El 4,285.00 Actual El 4,283.82 FRI 118	1006 N 12,341.04 E 11,042.59 TDV El 4,285.00 Actual El 4,283.81 FRI 119	1043 N 12,340.02 E 11,092.58 TDV El 4,285.00 Actual El 4,283.91 FRI 109	1042 N 12,339.00 E 11,142.57 TDV El 4,285.00 Actual El 4,283.90 FRI 110	1034 N 12,337.98 E 11,192.56 TDV El 4,285.00 Actual El 4,283.94 FRI 106	1058 N 12,336.96 E 11,242.55 TDV El 4,285.00 Actual El 4,283.95 FRI 105
1022 N 12,293.89 E 10,941.72 TDV El 4,275.00 Actual El 4,273.86 FRI 114	1021 N 12,292.87 E 10,991.76 TDV El 4,275.00 Actual El 4,273.91 FRI 109	1007 N 12,291.05 E 11,041.75 TDV El 4,275.00 Actual El 4,273.88 FRI 120	1045 N 12,290.03 E 11,091.74 TDV El 4,275.00 Actual El 4,273.76 FRI 124	1044 N 12,289.00 E 11,141.73 TDV El 4,275.00 Actual El 4,273.94 FRI 106	1025 N 12,287.98 E 11,191.72 TDV El 4,275.00 Actual El 4,273.98 FRI 102	1059 N 12,286.96 E 11,241.71 TDV El 4,275.00 Actual El 4,273.88 FRI 112
1012 N 12,243.10 E 10,940.93 TDV El 4,265.95 Actual El 4,265.86 FRI 059	1011 N 12,242.07 E 10,990.92 TDV El 4,265.13 Actual El 4,265.81 FRI 032	1008 N 12,241.05 E 11,040.91 TDV El 4,264.12 Actual El 4,265.68 FRI 044	1030 N 12,240.03 E 11,090.90 TDV El 4,266.05 Actual El 4,265.98 FRI 007	1029 N 12,239.01 E 11,140.89 TDV El 4,265.70 Actual El 4,265.33 FRI 037	1028 N 12,237.99 E 11,190.88 TDV El 4,265.41 Actual El 4,265.39 FRI 002	1060 N 12,236.97 E 11,240.87 TDV El 4,265.62 Actual El 4,265.56 FRI 006

Toe of Waste (protective cover previously placed)



**ENVIROCARE**  
OF UTAH, INC.  
THE SAFE ALTERNATIVE

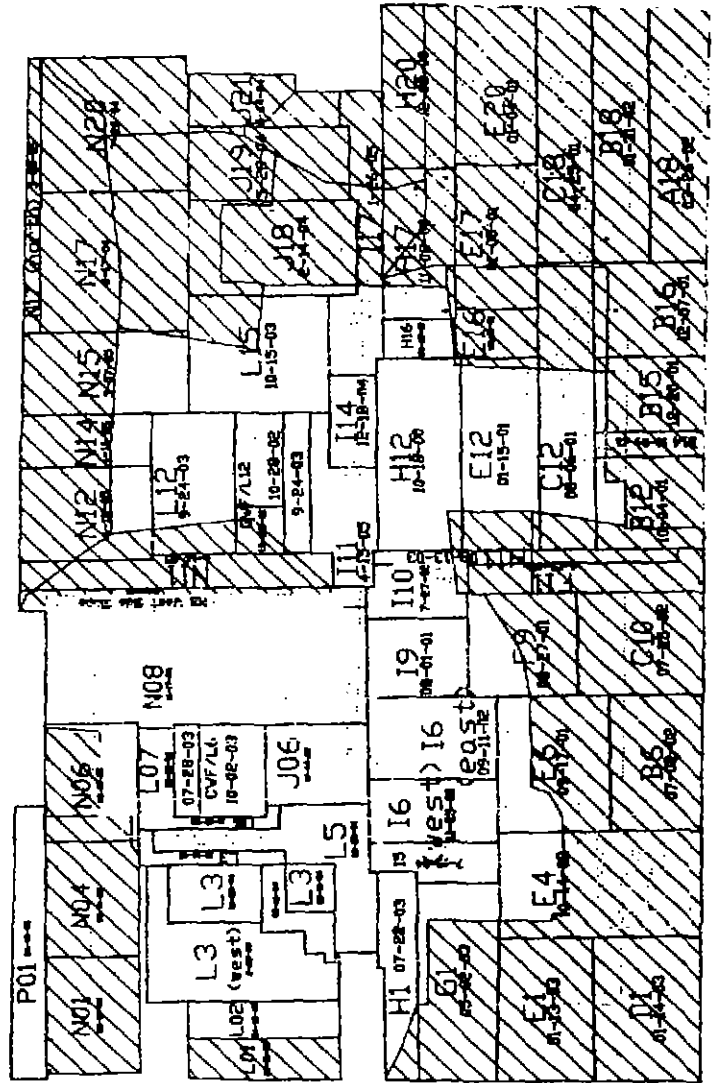
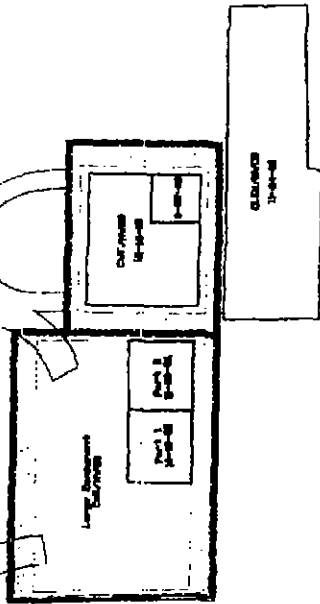
## ATTACHMENT 4



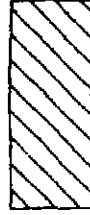
# CLASS A



Attachment 7-8

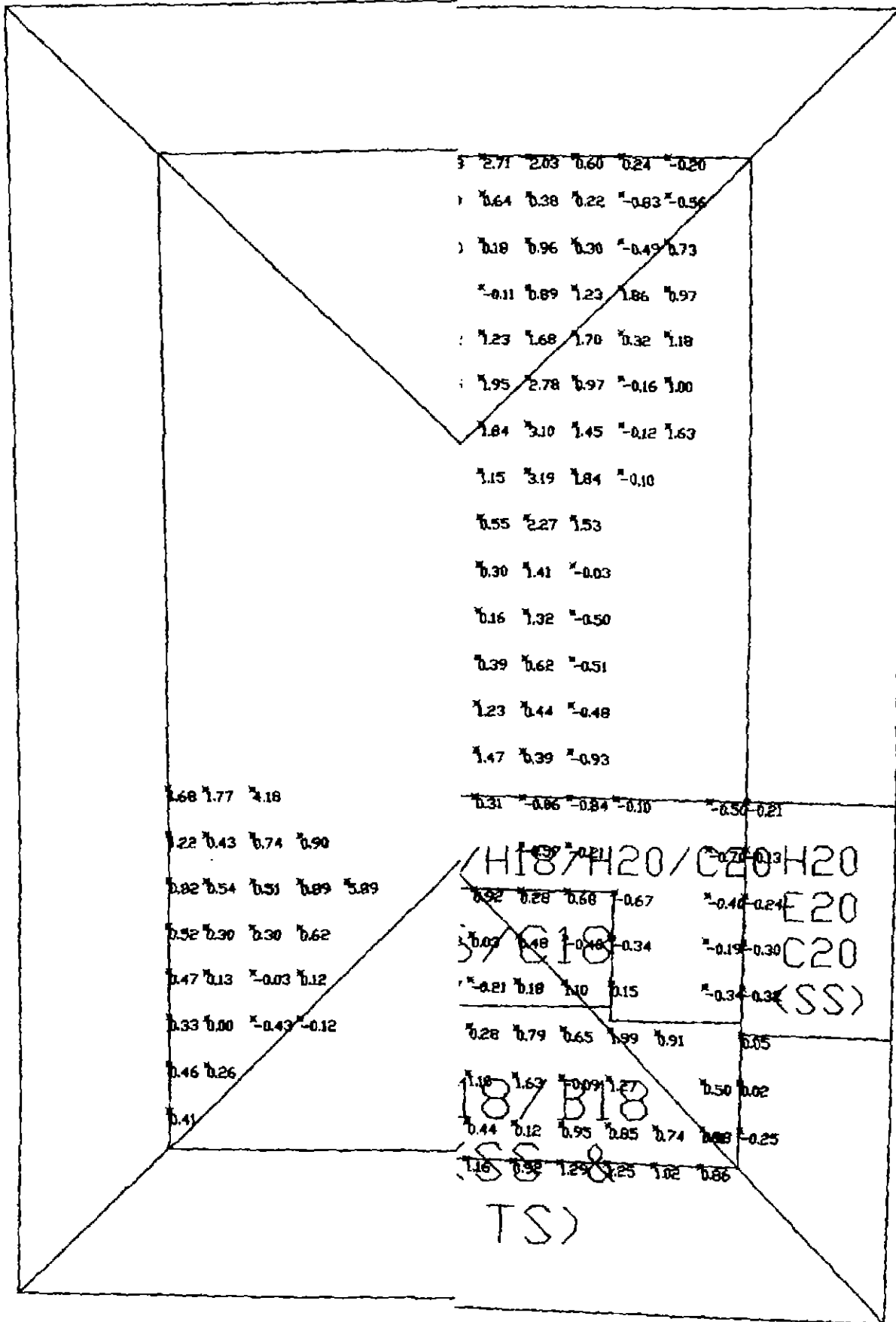


Temporary  
Cover  
1,742,920 sf



160 0 180 300

ENERGYSOLUTIONS



Attachment C - Buried stream channel"

EnergySolutions wrote a letter to the State of Utah on July 24, 2004 that stated " Recent experience in the eastern portion of Section 29 indicates that there is a buried stream channel that may run through CME's proposed site." (Section 29)

Rather than conduct any studies about this identified "buried stream channel" the State chose to ignore this potential threat to the site. Did anyone verify that there truly was a buried stream in Section 29? Did any one find the ends of the buried stream? Did anyone determine if this was the only stream in the area? How did someone conclude that there was no buried stream under Section 32 since there have not been excavations that deep in Section 32 as the ones that identified the buried stream in Section 29? There are many questions that need to be asked and answered before the State determines that this issue is not worth investigating further.

#### Attachment D - Limit Frost Penetration

Item 1 – Energy Solutions has performed many surveys on the already constructed cover system and has reported that they anticipate that in 2004 the embankment did not settle but actually rose as much as 6". See Attachment 2 which is a summary of the LARW Annual Settlement Data. EnergySolutions explains this unusually result was due to frost heave. (Report on the combined embankment study performed by AMEC earth and Environment on December 13, 2005). That report states that "The year 2004 measurements were conducted during the middle of the winter and "heave" is evident in the data. Frost heave is caused when water particles in the material freeze and expand, causing the surface of the ground to raise. This report from EnergySolutions brings up a major concern about the depth of frost penetration into the radon barrier. The question is how deep the frost would have to penetrate to get the surface of the soil to raise 6". Be aware that the top 18" of the rock cover would not create any raise at all because there would be no moisture in this zone to freeze. Below that is the filter zones, sacrificial soil and radon barrier. If all of these layers were to create 6" of heave then the depth of the frost must have been quite deep. It is very likely that if the surface rose 6" that the frost would have had to penetrate down into the radon barrier. This concern should be addressed and studied to determine how deep the frost penetrated to produce 6" of frost heave. There are several reasons that there may more frost penetration than has been suggested. These ideas are found in Items 2 and 3.

Item 2 : Energy Solutions has performed a technical review that would suggest that the maximum depth of the frost penetration would be 3.4 feet. This is extremely close to the maximum limit. Based on their analysis the frost will penetrate within 1.1 inches of the radon barrier. A major problem in the analysis is that "Both analyses incorporated a temperature data set based on the lowest recorded high and low temperature on each day through the freezing season (October through April) over the 47 years of data available from Dugway, Utah." Dugway is about 50 miles from the Clive site. There is similar data from a station located at Knolls, Utah which is less than 10 miles from the site. Why would anyone choose to use data 50 miles away when data from a much closer site is available and more representative of the site. A look at the Average Minimum (the input data for the frost penetration analysis) temperatures from the two locations show that the differences could create a problem. Attachment 1 shows the actual data from the two locations.

	AVERAGE MINIMUM TEMPERATURES (F)		
	DUGWAY	KNOLLS	Difference
October	35.4	34.8	-0.6
November	25.7	24.0	-1.7
December	17.7	12.1	-5.6
January	16.0	10.1	-5.9
February	22.5	18.0	-4.5
March	28.5	29.0	+0.5
April	35.5	37.6	+2.1

It is easy to see that during the coldest three months the average minimum temperature is 5 degrees less at Knolls than it is at Dugway. It is almost a given that this improved data would create a deeper frost penetration depth than is currently expected.

Item 3 – The frost penetration analysis is almost 10 years old and has not been updated with the new cover design. Some may say that this is not critical, however one of the main factors in frost penetration and frost heave is the amount of moisture in the soil material. A major concern is that there is no accurate data on how much moisture is being retained in the cover material. Energy Solutions has been asked to provide data from the cover test pad for over six years. To date they have yet to provide this important data that would help to determine the effects of frost heave and frost penetration. Until this data is available it is impossible to properly know the effects of frost penetration. The data should be gathered and the results should be used to better design the cover of the cells.

# LARW Annual Settlement Monument Data Analysis Summary

LARW Embankment Annual Settlement Monument Data										Total Movement Since Setting Monument						
	10/22/1999		2/13/2002		2/27/2003		1/23/2004		2/25/2005		Movement 2002 to 2003		Movement 2003 to 2004		Movement 2004 to 2005	
	Initial Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Feet	Feet	Feet	Feet	Feet	Feet	Feet
A0	4277.68	4277.68		4277.62	4277.62	4277.62	4277.62	4277.62	4277.62		0.25	-0.27	-0.08			
A2	4279.18	4279.18		4279.20	4279.20	4279.20	4279.20	4279.20	4279.20		0.26	-0.39	-0.12			
A4	4278.06	4278.06		4278.04	4278.04	4278.04	4278.04	4278.04	4278.04	0.05	0.23	-0.34	-0.13			
A5 RS	4277.07	4277.07	4277.99	4277.00	4277.00	4277.30	4277.30	4277.30	4277.30	0.04	0.30	-0.36	0.13			
A6 RS	4276.91	4277.71	4278.97	4277.71	4277.71	4277.93	4277.93	4277.93	4277.93	0.00	0.22	-0.32	0.70			
A7	4277.46	4277.43	4277.43	4277.46	4277.46	4277.67	4277.67	4277.67	4277.67	0.03	0.21	-0.35	-0.14			
B4	4268.28	4268.07	4268.07	4268.17	4268.17	4268.38	4268.38	4268.38	4268.38	0.10	0.22	-0.30	-0.18			
B5	4269.06	4269.31	4269.31	4269.35	4269.35	4269.58	4269.58	4269.58	4269.58	0.04	0.22	-0.36	0.16			
B6	4268.29	4268.36	4268.36	4268.30	4268.30	4268.50	4268.50	4268.50	4268.50	-0.05	0.19	-0.34	-0.13			
B7	4268.55	4268.21	4268.21	4268.23	4268.23	4268.39	4268.39	4268.39	4268.39	0.01	0.18	-0.36	-0.52			
B8	4268.91	4268.85	4268.85	4268.85	4268.85	4268.85	4268.85	4268.85	4268.85	0.00	0.09	-0.30	-0.26			
B9	4269.01	4268.98	4268.98	4268.89	4268.89	4268.89	4268.89	4268.89	4268.89	-0.07	-0.09	-0.07	-0.28			
B10	4268.30	4268.24	4268.24	4268.18	4268.18	4268.07	4268.07	4268.07	4268.07	-0.06	-0.10	-0.08	-0.30			
C0	4277.52	4277.52		4277.51	4277.51	4277.75	4277.75	4277.75	4277.75		0.24	-0.35	-0.13			
C2	4309.96	4309.96		4309.93	4309.93	4310.17	4310.17	4309.768	4309.768		0.24	-0.41	-0.20			
C4	4311.80	4311.75		4311.47	4311.47	4311.68	4311.68	missing	missing		0.21	-0.28	-0.07			
C5	4311.80	4311.80	4311.34	4311.36	4311.36	4311.54	4311.54	4311.267	4311.267	0.02	0.18	-0.28	-0.53			
C6	4311.42	4311.26	4311.26	4311.27	4311.27	4311.42	4311.42	4311.077	4311.077	0.02	0.15	-0.34	-0.34			
C7	4311.30	4311.09	4311.09	4311.03	4311.03	4311.15	4311.15	4311.900	4311.900	-0.06	0.13	-0.25	-0.40			
C8	4312.21	4312.02	4312.02	4311.98	4311.98	4312.08	4312.08	4311.768	4311.768	-0.04	0.10	-0.31	-0.44			
D4	4314.25	4313.88	4313.88	4313.99	4313.99	4314.18	4314.18	4313.826	4313.826		0.18	-0.35	-0.42			
D5	4314.38	4314.17	4314.17	4314.13	4314.13	4314.06	4314.06	4313.684	4313.684	0.03	0.15	-0.36	-0.71			
D6	4314.80	4314.40	4314.40	4314.32	4314.32	4314.40	4314.40	4314.005	4314.005	-0.04	0.11	-0.34	-0.90			
D7	4314.38	4313.59	4313.59	4313.46	4313.46	4313.54	4313.54	4313.186	4313.186	-0.08	0.08	-0.40	-0.38			
D8	4313.72	4313.11	4313.11	4312.75	4312.75	4312.75	4312.75	4312.319	4312.319	-0.13	0.08	-0.36	-0.53			
E0	4277.11	4277.11		4277.13	4277.13	4277.35	4277.35	4277.016	4277.016		0.22	-0.33	-0.08			
E2	4309.78	4309.78		4309.60	4309.60	4309.86	4309.86	4309.464	4309.464		0.26	-0.40	-0.30			
E3	4312.70	4312.70		4312.50	4312.50	4312.70	4312.70	4312.319	4312.319		0.20	-0.38	-0.38			
E4	4316.50	4316.50		4316.15	4316.15	4316.32	4316.32	4315.892	4315.892		0.17	-0.43	-0.81			
E5	4316.05	4316.05	4316.36	4316.28	4316.28	4316.48	4316.48	4315.970	4315.970	-0.07	0.19	-0.51	-0.98			
E6	4316.43	4316.19	4316.19	4316.13	4316.13	4316.26	4316.26	4315.800	4315.800	-0.07	0.13	-0.46	-0.63			
E7	4316.92	4316.50	4316.50	4316.42	4316.42	4316.50	4316.50	4316.118	4316.118	-0.08	0.07	-0.38	-0.80			
E8	4314.50	4314.09	4314.09	4314.01	4314.01	4314.08	4314.08	4313.732	4313.732	-0.08	0.07	-0.34	-0.77			
F0	4276.94	4276.94		4276.94	4276.94	4277.18	4277.18	4276.822	4276.822		0.25	-0.36	-0.12			
F1	4297.38	4297.38		4297.28	4297.28	4297.52	4297.52	4297.187	4297.187		0.24	-0.33	-0.19			
F2	4309.36	4309.36		4309.24	4309.24	4309.48	4309.48	4309.135	4309.135		0.24	-0.35	-0.24			
F3	4312.82	4312.82	4312.24	4312.22	4312.22	4312.49	4312.49	4312.124	4312.124	-0.02	0.27	-0.37	-0.50			
F4	4316.57	4316.57		4316.24	4316.24	4316.41	4316.41	4316.023	4316.023		0.17	-0.38	-0.55			
F5	4319.07	4318.07		4318.45	4318.45	4318.57	4318.57	4318.188	4318.188		0.12	-0.37	-0.87			
F6	4318.50	4318.41	4318.41	4318.29	4318.29	4318.42	4318.42	4318.052	4318.052	-0.11	0.13	-0.37	-0.45			
F7	4317.36	4316.89	4316.89	4316.76	4316.76	4316.85	4316.85	4316.507	4316.507	-0.13	0.08	-0.34	-0.85			
F8	4314.50	4314.15	4314.15	4314.00	4314.00	4314.03	4314.03	4313.743	4313.743	-0.14	0.03	-0.29	-0.76			
G0	4277.17	4277.17		4277.15	4277.15	4277.37	4277.37	4277.073	4277.073		0.22	-0.30	-0.10			
G1	4297.23	4297.23		4297.15	4297.15	4297.39	4297.39	4297.031	4297.031		0.24	-0.36	-0.20			
G2	4309.65	4309.65		4309.48	4309.48	4309.70	4309.70	4309.358	4309.358		0.21	-0.34	-0.20			
G3	4312.99	4312.99		4312.72	4312.72	4312.92	4312.92	4312.582	4312.582		0.20	-0.34	-0.41			
G4	4316.55	4316.55	4316.99	4315.98	4315.98	4316.15	4316.15	4315.796	4315.796	-0.01	0.17	-0.36	-0.76			
G5	4319.16	4318.33	4318.33	4318.29	4318.29	4318.44	4318.44	4318.072	4318.072	-0.05	0.15	-0.36	-1.09			
G6	4319.42	4319.11	4319.11	4319.04	4319.04	4319.17	4319.17	4318.933	4318.933	-0.08	0.14	-0.34	-0.59			
G7	4317.28	4316.86	4316.86	4316.75	4316.75	4316.83	4316.83	4316.485	4316.485	-0.11	0.09	-0.35	-0.80			
G8	4314.87	4314.24	4314.24	4314.14	4314.14	4314.24	4314.24	4313.878	4313.878	-0.10	0.10	-0.30	-0.99			
H0	4277.22	4277.22		4277.25	4277.25	4277.48	4277.48	4277.181	4277.181		0.24	-0.31	-0.04			
H1	4297.02	4297.02		4296.89	4296.89	4297.13	4297.13	4296.696	4296.696		0.23	-0.43	-0.32			
H2	4309.80	4309.80		4309.39	4309.39	4309.57	4309.57	4308.233	4308.233		0.18	-0.34	-0.37			
H3	4313.12	4313.12		4312.79	4312.79	4312.97	4312.97	4312.843	4312.843		0.17	-0.32	-0.46			
H4	4316.81	4316.81	4316.11	4316.07	4316.07	4316.22	4316.22	4315.893	4315.893	-0.04	0.16	-0.33	-0.72			
H5	4318.85	4318.23	4318.23	4318.20	4318.20	4318.32	4318.32	4317.981	4317.981	-0.04	0.12	-0.34	-0.97			
H6	4319.80	4319.57	4319.57	4319.57	4319.57	4319.72	4319.72	4319.234	4319.234	-0.10	0.12	-0.35	-0.57			
H7	4317.48	4317.08	4317.08	4317.08	4317.08	4317.25	4317.25	4316.726	4316.726	-0.09	0.07	-0.34	-0.75			

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LARVI Embankment A Settlement Monument Data										Total Movement Since Setting Monument									
	10/22/2002		2/13/2003		1/23/2004		2/23/2005			Movement 2002 to 2003		Movement 2003 to 2004		Movement 2004 to 2005					
	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation		Feet	Feet	Feet	Feet	Feet	Feet	1.25	0.75	0.25	0.75
10	4276.94	4276.94	4276.99	4277.12	4276.802														
11	4296.71	4296.71	4296.93	4296.85	4296.426														
12	4309.57	4309.57	4309.39	4309.07	4309.270														
13	4312.98	4312.98	4312.60	4312.86	4312.445														
14	4316.28	4316.04	4315.68	4316.15	4315.763														
15	4319.21	4318.71	4318.70	4318.21	4318.428														
16 RS	4318.02	4318.92	4318.67	4318.78	4318.196														
17	4317.30	4316.99	4316.62	4316.72	4316.368														
17.1 RS	4317.83	4317.83	4318.31	4316.45	4318.083														
18	4314.09	4314.09	4313.68	4313.70	4313.448														
18.1 RS	4314.38	4314.38	4313.54	4313.50	4313.253														
19	4316.32	4315.27	4315.18	4315.32	4315.044														
20	4316.04	4316.58	4316.73	4316.73	4316.380														
21	4319.21	4319.21	4319.33	4319.33	4318.998														
22	4316.81	4316.81	4316.78	4316.78	4316.503														
23	4314.11	4314.11	4313.98	4313.98	4313.688														
24	4276.14	4276.14	4276.32	4276.32	4276.030														
25	4309.29	4309.29	4309.17	4309.28	4309.030														
26	4316.71	4315.71	4315.60	4315.57	4315.382														
27	4318.21	4318.75	4318.83	4318.83	4318.523														
28	4318.19	4318.19	4318.23	4318.23	4318.934														
29	4318.82	4318.82	4318.88	4318.88	4318.516														
30	4314.03	4314.03	4313.97	4313.97	4313.687														
31	4318.02	4318.02	4318.92	4318.92	4318.688														
32	4316.41	4316.41	4316.41	4316.41	4316.130														
33	4316.01	4316.01	4316.01	4316.01	4316.288														
34	4314.08	4314.08	4314.08	4314.08	4313.795														
35	4310.43	4310.43	4310.06	4310.11	4309.870														
36	4315.45	4314.98	4314.81	4314.86	4314.839														
37	4319.55	4319.55	4319.55	4319.55	4319.268														
38	4319.68	4319.68	4319.68	4319.68	4319.475														
39	4316.72	4316.72	4316.72	4316.72	4316.442														
40	4314.17	4314.17	4314.17	4314.17	4313.878														
41	4296.13	4296.23	4296.70	4296.26	4296.013														
42	4311.58	4311.15	4311.10	4311.15	4310.824														
43	4313.88	4313.55	4313.55	4313.56	4313.245														
44	4316.78	4316.23	4316.23	4316.24	4315.902														
45	4319.30	4319.30	4319.39	4319.39	4319.158														
46	4319.62	4319.62	4319.82	4319.82	4319.329														
47	4318.91	4318.91	4318.81	4318.81	4318.554														
48	4313.97	4313.97	4313.87	4313.87	4313.732														
49	4296.78	4296.78	4296.78	4296.78	4296.442														
50	4311.37	4310.72	4310.68	4310.68	4310.538														
51	4313.72	4313.32	4313.24	4313.24	4313.011														
52	4318.95	4318.36	4318.32	4318.32	4318.100														
53	4318.23	4318.23	4318.23	4318.23	4317.907														
54	4318.22	4318.22	4318.22	4318.22	4318.002														
55	4316.85	4316.85	4316.95	4316.95	4316.728														
56	4313.86	4313.86	4313.86	4313.86	4313.648														
57	4298.97	4298.97	4298.97	4298.97	4298.738														
58	4310.62	4310.62	4310.55	4310.55	4310.389														
59	4313.54	4313.54	4313.41	4313.41	4313.284														

Note: In all cases, negative numbers indicate settlement, and positive numbers (in red) indicate heave.

4-3

**KNOLLS 10 NE, UTAH (424748)****1961-1990 Monthly Climate Summary**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	33.1	42.2	55.3	67.8	73.1	86.9	94.3	91.4	81.6	67.2	49.8	36.0	65.1
Average Min. Temperature (F)	10.1	18.0	29.0	37.6	43.9	54.8	61.2	57.9	47.1	34.8	24.0	12.1	36.0
Average Total Precipitation (in.)	0.41	0.27	0.54	0.86	1.06	0.31	0.18	0.33	0.53	0.70	0.42	0.54	6.14

Unofficial values based on averages/sums of smoothed daily data. Information is computed from available daily data during the 1961-1990 period. Smoothing, missing data and observation-time changes may cause these 1961-1990 values to differ from official NCDC values. This table is presented for use at locations that don't have official NCDC data. No adjustments are made for missing data or time of observation. Check the official table for official data.

*Western Regional Climate Center, 1999*